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PERMISSIVENESS VERSUS RIGIDITY IN RELATION TO CHILD REARING, PERSONALITY AND CULTURE

A symposium presented at the New York Meeting of the Society for Research in Child Development, December 28, 1949

Wayne Dennis, *Presiding*
University of Pittsburgh

MATERNAL PUNITIVENESS AND CHILDREN'S AGGRESSION
Robert R. Sears, *Harvard University*

ANIMALS AND CHILDREN
Fred S. Keller, *Columbia University*

PERMISSIVENESS VERSUS RIGIDITY AS SEEN IN PSYCHOTHERAPY WITH CHILDREN
Lucie Jessner, *Massachusetts General Hospital*

RELATION OF FANTASY AGGRESSION TO INTERPERSONAL AGGRESSION [1]

ROBERT R. SEARS
Harvard University

In a collaborative study of the relationship between maternal child-rearing practices and children's aggression, 42 preschool-aged children were observed in free play and in doll play. Their mothers were interviewed, and the recorded information was analyzed in such a way as to provide a measure of the severity with which aggression at home was punished. The data therefore permit a comparison of the relative frequency and the kind of aggression occurring in children both in real life in the preschool and in the fantasy of doll play, under different degrees of punishment at home.

From a theoretical standpoint (6), it would be expected that mild punishments would serve to frustrate a child and hence increase his aggression. This increase should be apparent in all contexts, at home, in school, and in fantasy. More severe punishments, however, should tend to inhibit aggression at home, but increase frustration so markedly as to instigate high aggression elsewhere (3). If the home, the school, and the doll play setting are considered as lying on a dimension of similarity, with the home as the original source of reinforcement for both aggression and inhibition, there should be a stimulus generalization for both types of reaction. Since anxiety generalizes less extensively than a positive response such as aggression, the inhibition in cases of severe punishment would be expected to affect preschool behavior but leave doll play behavior not only uninhibited but actually increased, because of the additional frustration created by the punishment.

McKee (4) divided the children into three sub-groups, those suffering low, medium and high amounts of punishment for aggression at home. He then plotted the mean frequency of aggressive behavior in preschool as this had been observed by Gewirtz (1). McKee found that the low and high punishment groups were approximately the same in mean frequency of overt aggression, while the medium punished group had a reliably higher frequency. This corresponds with theoretical expectations.

A comparison of these same groups with respect to frequency of aggressive acts in two twenty-minute sessions of doll play (5) gives further support to the interpretation in terms of generalization and the frustrating

[1] Abstract of paper delivered at the Symposium on Permissiveness versus Rigidity in Relation to Child Rearing, Personality and Culture, at the meetings of the Society for Research in Child Development, New York, December 28, 1949.

effect of punishment. The low punished group had a mean frequency of 11.6, the medium group, 19.4, and the high group, 24.5. Thus, while the most severely punished group was inhibited in overt interpersonal aggression, it was the most aggressive in fantasy.

It is interesting to note that the dolls used to portray aggression by the three groups reveal signs of the relative severity of anxiety induced by the different amounts of punishment. From other data (2, 6, 7) it has been shown that high aggression-anxiety leads to greater usage of the child dolls than the parent dolls, and more thematic-doll-agent aggression than self-toward-equipment aggression. In the present instance, so much of the low punished group's aggression was of the latter type that no adequate comparison can be made of the parent doll - child doll frequencies. The medium and high punished groups showed the expected difference, however. The medium group had almost twice as many aggressive acts portrayed by parent doll agents as by child doll agents, and the high punished group had exactly twice as many portrayed by child doll agents as by parent doll agents. None of these differences reaches a high level of confidence by *t*-tests, because the variability of both preschool behavior and doll play aggression was extremely great in the high punished group. The directions of the differences are all consistent, however, with the interpretations couched in terms of stimulus generalization and the frustrating effects of punishment of aggression.

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ANIMALS AND CHILDREN [1]

FRED S. KELLER
Columbia University

Before anything relevant to the topic of this symposium can be said, a more general question must be raised. What can the student of child development expect from the student of animal behavior? This question is answerable, although the answer may not be quieting or readily accepted. One thing that may certainly be expected from animal behavior study is *theory*.

Theory, of course, is what the animal worker has, for some time back, been offering. Since the time of John Watson, systematists in psychology have leaned heavily, sometimes exclusively, upon research with animal subjects; and there are no signs, among the experimentalists, that this dependency is decreasing. The opposite, if anything, appears to be the case. Today, in *reinforcement* theory (sometimes called *behavior* theory), a fresh offer is in the making—an offer that is likely to be pressed more vigorously and more insistently than any of those in the past.

Reinforcement theory is an integration of experimental facts commonly associated with the names of Hull and Skinner, but it has already grown beyond a point where any important purpose is served by talking about *Hullians* or *Skinnerites*. Reinforcement theorists are now to be found in many of our universities; and the age of discipleship in psychology seems, happily, to be passing. Indeed, historians of the present epoch may well decide that Pavlov, Thorndike, and (despite his non-experimentalism) Freud were the *fathers* of this movement, giving to Hull and Skinner the status of *founders*.

A comprehensive treatment of this theory would include an account of elicited and emitted (voluntary) behavior, of conditioning, extinction, discrimination, and several other basic principles. It would consider the *interrelation* of these principles, now a matter of major concern; and it would deal with their extension within classical areas of experimental psychology to give an interlocking account of many previously insulated topics. Such a treatment, of course, cannot be presented here; but something may be said about those aspects of the system which bear, more or less directly, upon the present discussion.

In the remarks to follow, it will be impossible to avoid using one or two terms that may seem unduly technical for the present occasion. I should

[1] Delivered at the Symposium on Permissiveness versus Rigidity in Relation to Child Rearing, Personality and Culture, at the meetings of the Society for Research in Child Development, New York, December 28, 1949.

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like to dispense with them here, but they do provide a degree of specification that is lacking in "plain English" and in their psychological predecessors. It is only to be hoped that a regard for scientific clarity will outweigh the objection to a little novelty.

The reinforcement theorist is obviously concerned with reinforcement, of which two kinds may be identified. There is *positive* reinforcement and *negative* reinforcement. Reinforcement refers to a function of stimuli, and we may speak of positively reinforcing stimuli or positive "reinforcers" as those stimuli which, when presented to an organism, *strengthen* the response that they follow. *Negative* reinforcers *weaken* the response that they follow; but this weakening is not the equivalent of an eradication or extinction of the response. Rather, it is more of a *suppression.* The effect is that of *punishment;* and there is evidence to show that the punished response will, under certain circumstances, exhibit all its pristine strength.

Positive reinforcers may be *primary,* like food, water, and sex mates for suitably motivated organisms; or they may be *secondary,* like tones, lights, or other initially neutral stimuli which have often served as cues for primarily reinforced responses. These are the *derived,* or *conditioned* reinforcers that have sometimes been called *token rewards. Approval,* in the form of a word, a nod, or a smile, often qualifies as a secondary reinforcer. *Money,* for most of us, is another. For the child of our culture, the *mother,* in any or all of her stimulus aspects, early becomes a powerful agent of this sort.

Primary *negative* reinforcers include such things as slaps, blows, shocks, burns, and other forms of intense stimulation. Secondary negative reinforcers comprise those initially neutral stimuli which, through association with primary reinforcers, come to exercise a similar depressive effect upon the behavior with which they are correlated. If secondary *positive* reinforcement is thought of as a *promise of reward,* secondary *negative* reinforcement may be thought of as a *threat of punishment.* Again, in our society, the mother may have a negatively reinforcing status as well as a positively reinforcing one. She may take on the character of the wicked witch no less than that of the fairy godmother. The two functions, unfortunately for the child, may sometimes be exercised with reference to the same form of activity.

Negative reinforcers may also be treated as stimuli the *removal* of which is *strengthening.* For example: an electric shock may exert a weakening effect upon whatever behavior is in progress at the time of its application; but, if this shock is continued and its intensity is not so great as to disorganize behavior completely, any response that is permitted to remove it will be strengthened. This is especially clear in the case of *primary* negative reinforcers, as in the classical picture of *escape* behavior; but it holds also for *secondary* negative reinforcers. An organism's reinforcement may consist only in the removal of a light, a tone, or even a "general situation," provided that some primary reinforcer, like shock, has previously

been associated with such stimulation. Some writers have gone further, to say that in presenting such secondary reinforcers we arouse a state of *anxiety,* which is only reduced by their removal.

These generalizations arise from observations of animal behavior in various experimental situations, and they are paralleled by age-old statements about human conduct. It is unlikely that many would disagree with the suggestion that primary reinforcement, positive or negative, is related to such a problem as that of permissiveness and rigidity in child training; isn't this "reward" and "punishment" all over again? Probably, too, not many would take issue with the assertion that the reinforcers of child behavior are often of the secondary sort; we have all heard of "approval" and "disapproval." There might even be some agreement with the animal worker's definition of *avoidance* and *anxiety.*

Very few, however, would feel that they had learned anything new, helpful, or inspiring from this way of treating behavior. Still fewer would be willing to replace the old familiar terms with "reinforcement jargon." And many would reject forcefully the implication that human behavior, in all its complexity, is amenable to analysis with the tools provided by the white rat, the dog, or the anthropoid ape.

These reactions are understandable, but they miss some important points. The first one is that, for the reinforcement theorist, the degree of control and prediction achieved through his initial formulation marks the beginning, rather than the end, of research. He may be pleased to find behavioral analogues and parallels in the everyday life of human beings and at other levels of descriptive rigor—he would be unnatural if he didn't. But a good theory, as often noted, is autocatalytic; and he soon finds himself confronted with a host of new experimental problems. The solutions of these problems may, or they may not, have obvious counterparts elsewhere, but they cannot fail to further his understanding. There is but one path open to him, and he is duty-bound to take it.

Such a development is now underway and we have scores of observations which indicate its fruitfulness. In the field of secondary reinforcement alone, considerable progress has been made. We have learned, among other things, that (1) any neutral stimulus thus far tested, including the proprioceptive or response-produced, may acquire reinforcing power through its connection with some type of primary reinforcement. A tone, a light, or the *making of some movement,* which has regularly been followed by food or water, may itself be used to strengthen, say, a running, a lever-pressing, or a chain-pulling response. (2) The response that is strengthened by such a secondary reinforcer may be entirely different from the one with which primary reinforcement has been correlated. Thus, an auditory stimulus, formerly associated with running to food, may be used to strengthen a lever-pressing response. (3) A secondary reinforcer, established under one dominant motive (e.g., thirst), may serve to strengthen a response under some other dominant motive, say hunger. (4) Recently we have found that

a stimulus must be *discriminative* if it is to take on reinforcing value. It has been shown that the reinforcing effect of a light upon a white rat's running is a function of the degree to which this light had become a discriminative stimulus for this response. Mere temporal contiguity of a neutral stimulus and a primary reinforcer is apparently not enough to set up the neutral stimulus as a secondary reinforcer.

Similar findings have been obtained in connection with secondary negative reinforcement, although the work in this area is not well advanced. I have been especially impressed, during the past year, with an apparent demonstration, with white rats, that a postural response (holding a door open) may be maintained for long periods of time because it removes proprioceptive stimuli that have been associated with the negatively reinforced act of letting the door close. The primary reinforcer, in this instance, was a fairly intense light, from which escape had been possible by opening the door. The animal came ultimately to escape from some of *his own responding,* merely because it had previously been accompanied by the noxious light.

Such findings go beyond elementary statements concerning reward and punishment, approval and disapproval, and so on. They tell us about a few of the circumstances under which stimuli may operate to strengthen or weaken behavior and, more significantly, they aid in the systematic integration of fact and principle which *is* theory in the best sense of the word. They do not, of course, transcend the influences of heredity and maturation—influences which set limits to behavioral change; but they are independent of physiological or psychic assumptions. They enhance appreciably our powers of control and prediction, and the number of research problems they suggest is embarrassingly great.

A second point concerns the general relevance of animal studies to an account of human behavior. Professor Beach has recently given us a picture of the Pied Piper, in the form of a white rat, leading psychologists to destruction. Beach was speaking in jest, and in behalf of other animal species, but the vivid figure will undoubtedly be put to use by those who feel that principles derived from rat behavior can never encompass the complexity of human response—even, perhaps, at the pre-verbal or pre-social stage.

Extrapolation from rats or dogs or apes to man is always dangerous, but not because man is complex and the animal simple, or because man is a social creature and the animal is not, or because man alone exhibits verbal behavior. The simplicity of the rat has been exaggerated, and the problems of social and verbal behavior are still problems of behavior, to be dealt with as any other by appeal to controlling variables in the environment, past or present. Whatever uniqueness attaches to such behavior appears to arise from the fact that its reinforcement is mediated by the behavior of other organisms.

The danger in extrapolation lies, rather, in the fact that it may be super-

ficial or premature, reflecting a failure to recognize complexity at the animal, no less than at the human, level. And, in this respect, the animal worker who naively treats man as a kind of king-sized rat is no more at fault than the student of, say, child behavior who utilizes animal research uncritically whenever it seems to serve his purpose.

There is a final point. Extrapolation is not the life line of the reinforcement theorist who wishes to reach human conduct at any stage of its development. There is an obvious, and better, solution: he may, in many cases, deal with human *subjects* in his research. Some experimental problems, it is true, are best approached with animals. Others, such as those of verbal behavior, are not; and a systematic program which fails to attack these problems frontally will always be under fire.

The recent progress of reinforcement theory has depended largely upon the choice of behavior samples that could be measured in terms of their frequency of occurrence in time—as in the case of the lever-pressing response. This choice has made it possible to discover a good deal of orderliness in the behavior of individual animals without a laborious restriction of experimental conditions. Many of the most interesting and satisfying results have been obtained under circumstances no more artificial than that represented by an infant in his play-pen or crib, and with fewer subjects than are commonly available in a nursery group. Some advance has even been made with animal subjects having a known history of research participation. In view of these facts, it is hard to believe that animals are more suitable than infants and young children in many studies aimed at the further development of behavior theory. The fundamental requirements of technique and design should be met easily.

It is, however, improbable that any great number of animal workers will forsake their rat colonies and their plans of research to enter this promising area. In addition to their understandable inclination to stay on familiar ground, and their personal frustrations in rearing their own offspring, they may have unconsciously accepted the "hands-off" admonitions of their critics. Nor is it to be expected that students of child behavior will suddenly reorient their research in line with theoretical proposals from "below." One surmises that there are difficulties in the way of this which stem from the nature of their subject matter. To the animal worker, from whom nothing very useful is expected, it sometimes appears that research in child behavior is hampered by its own best friends. So much is demanded, and so soon. The very theme of this symposium seems to reflect practical considerations somewhat remote from the atmosphere of inquiry in which basic research prospers.

Nevertheless, an understanding of behavior, animal or child, cannot be expected in the absence of theory. If it is not one theory, it will have to be another. There is no escaping an ultimate organization of the facts. Reinforcement theory is a step in this direction. It has met with some initial success at the animal level and within the field of experimental

psychology in general; and it has made suggestive points of contact with ideas of clinical or psychoanalytic origin. Its future will depend upon the ease with which it handles questions of social and verbal interaction. The experimental investigation of infant and child behavior presents itself as an alluring approach to this goal. It will be a pity if outmoded objections and extrascientific considerations stand in the way of its attainment.

SOME ASPECTS OF PERMISSIVENESS IN PSYCHOTHERAPY OF CHILDREN [1]

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Mary, a five-year-old shy and anxious girl, was admitted to the hospital to have her tonsils out. She insisted on keeping her doll, Sparky, stating that it had an earache and was sick. During her hospitalization, Mary cared for the sick doll, and declared it was a good thing that Sparky wasn't alone and had her mother with her. It seemed to the psychiatrist important to permit Mary her doll, as it served to help her to overcome her anxiety and loneliness in the hospital.

A nine-year-old boy, Robert, suffering from rheumatoid arthritis since the age of one and a half, was hospitalized for the seventh time and presented a severe feeding problem. He asked for fancy dishes, e.g., crocodile meat and pigeon breasts. In psychiatric interviews, it became clear that Robert didn't care for those tidbits, but that he wanted reassurance against his feeling that nobody cared whether a wreck like him would live or die. The trouble his nurses took in meeting his extravagant requests gave him proof that people were interested in him. This relief, however, was only temporary and led to demands which could not be met. Here the psychiatrist felt that permissiveness was futile and that instead of granting Robert's demands, it was important to get at his basic emotional frustration and to help him to overcome his fear of being abandoned.

These two examples are cited in order to demonstrate that the understanding of the emotional situation forms the basis for a decision as to whether or not permissiveness will contribute to the therapeutic goal.

In order to gain this understanding, we need the child's free expression of his feelings and fantasies, his conscious and unconscious motives, the image he has of himself and his orbit. For this purpose, the psychiatrist may utilize permissiveness as a tool and in the beginning of his contact with the child keep interference at a minimum. The child is more apt to give us clues to understanding in a permissive atmosphere than in a restrictive one. This license may help the child to display his usual asocial pattern, and even bring out impulses which the child has already learned to suppress or to conceal. So it often looks to mother or teacher as if the psychiatrist is undermining the child's education.

[1] Delivered at the Symposium on Permissiveness versus Rigidity in Relation to Child Rearing, Personality and Culture, at the meetings of the Society for Research in Child Development, New York, December 28, 1949.

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Another prerequisite for psychotherapy besides understanding is a positive relationship of the child to the psychiatrist. Some disturbed children can trust an adult only when they feel accepted as they are and not as they should be. Children who have been reacting to limitations with fear, rebellion, withdrawal or resentful submission will repeat the same pattern with the psychiatrist unles he has a different approach than a parent. It is particularly the destructive and aggressive child who needs a permissive attitude in order to form a positive relationship.

Permissiveness may be a therapeutic tool also when utilized in order to provoke activity in certain inhibited children. Larry, a six-year-old boy, was referred because he had difficulties in learning. He appeared like a lump of clay reflecting the fingerprints of his modeler, a fairly dominant mother. He liked to hear stories of violence, and would then become silent. When encouraged in activities, e.g. playing with the washing machine, he became quite messy and noisy before he could finally say that he could not think or do his work in school when his teacher "hollers," and that he would like to put a shingle with tacks in his pants so that she would get a bloody hand, should she spank him. "I'd stuff her under the desk and I'd run the class," he said. He became disobedient and aggressive at home, and it was diffiicult for his mother to cope with his new type of behavior. We, however, felt that an aggressive phase was a necessary transition from his subdued helpless rage towards masculinity and self-assertion in school.

Permission to the degree of provoking aggressive behavior seems indicated also for some children with psychosomatic illness in order to diminish their constant inner tension. Steven, an asthmatic boy of eight, appeared infantile, passive, overdependent on his mother, retreating from competition in play with his contemporaries. He was on guard during interviews until he felt sure of the therapist's acceptance. Then he revealed his fear of men who would come and kill or enslave his mother and choke him. These ideas were related to Steven's fantasies about his father, whom his mother had divorced when Steven was two years old. His conception of men as cruel and threatening turned out to be a projection of his own violent tendencies. He was afraid of retribution for the cruel intentions, which he had, so far, acted out only in a veiled, indirect manner by the clinging and demanding ways of the sick child. With the encouragement of the psychiatrist, Steven expressed his murderous and sexual fantasies in play with dolls and in words. His fear of retaliation decreased, but it also led him to test out whether he was still accepted and would not be punished, even if he was that bad. The psychiatrist wished that he would keep all of his expressions in the realm of play and desire; he, however, acted them out, became defiant in interviews, as well as at home, to the point of setting a fire. He was free of asthma, but was quite a behavior problem for several months. Then his fears, and with them his dependency on his mother, diminished further, and he could manifest his aggressiveness in a socially acceptable way in games with boys of his age.

This example of setting a fire shows that permissiveness has its pitfalls. It is obvious that limits have to be set to protect the child from harming himself or others. But it is not only physical danger which has to be prevented. There are psychological implications that make an all-permissive attitude hazardous for the child. Our experience shows us that the aggressive child, when no boundaries are set, may finally become frantically destructive and will, as a consequence, be afraid of his own overwhelming impulses. Most children will feel guilty and will therefore provoke punishment as a release from the guilt feelings their aggressive behavior has brought on. We also easily recognize that behind some extravagant demands is actually the wish of the insecure child to be guided by restrictions.

August Aichorn (1) has demonstrated in cases of delinquent or antisocial youth that these reactions can be treated successfully in an institution. In the special setting he created for these antisocial children, such a period of increased aggression, brought on through lack of discipline, is followed by one of pseudo-aggression, during which the patient goes only through the motions, and finally gives up his pattern of destructiveness. In psychotherapy, however, the child is seen for only a fraction of his daily life, while most of the time he is confronted with the usual requests of his environment.Although we always work with the child's mother in an attempt to help her meet the emotional needs of her child, modifications are possible only within a cultural pattern. Therefore, we cannot afford an increase in misbehavior beyond the tolerance of the patient's environment, nor should we heighten the level of anxiety beyond the child's capacity to deal with it.

How can the psychiatrist prevent or lessen the negative effects of permissiveness when it is greater in psychotherapeutic interviews than on the outside?

First, by differentiating the psychotherapeutic experience from reality events, bringing it into the area of play-acting, of learning, of practicing. A six-year-old boy expressed his awareness of the unreal character of the interviews, when he said that he never dreams when he is asleep, but "I only dream when I see you. You are my sleepy head."

A second tool to temper the dangers of permissiveness is the special relationship of the psychiatrist to the child, the transference relationship. In contrast to the people with whom the child is entangled, the psychiatrist does not become personally involved. While the child should be aware of the psychiatrist's empathy and acceptance, a certain neutrality and moderation of affection prevails. Otherwise, it can be very difficult for the child to express hostility or it might lead him into an overdependence on his therapist.

Another tool of psychotherapy, which is of the greatest importance in the course of treatment, consists of making the child aware of the meaning of his actions. For instance, Nina, a destructive and hostile four-year-old girl, repeatedly threw a woman figure down the staircase of the dollhouse,

stating with glee, "She is dead, dead, dead." Immediately afterwards, Nina would become uneasy and anxious, whispering, "Put her back." Then she dashed out of the playroom to see her mother. It was pointed out to Nina that she wanted the woman to be dead, but then wished it didn't really happen. An interpretation of her conflicting tendencies and of her ambivalence toward her mother made Nina aware of her positive feelings, and gave her the reassurance that she would not carry out her murderous impulses.

While all-permissiveness is not possible, and a certain amount of limitation is necessary to keep the child within the safety zone, we still feel that restriction is not the therapy itself. If we understand what lies behind the child's aggressiveness, e.g. anxiety, or guilt feelings, or frustrated wishes for love, we can deal with these emotions, and thus decrease tension. These changes usually come only gradually, in the form of a slow learning process. According to Robert Sears, "Theory of psychotherapy may be based explicitly on the learning process" (3).

Learning here consists mainly in what Freud regarded as the sign of maturation, the transition from the pleasure principle to the reality principle. This means a renunciation of the immediate fulfillment of wishes and the capacity to postpone gratification, in order to reach more important goals. We want to emphasize that this learning process in emotionally disturbed children usually is very slow, and not without periods of regression. It sometimes contributes to the total course of treatment to be permissive during the transient regressive stages. These periods impress the observer as objectionable behavior, but are really the child's attempt at adaptation. For instance, Mary, an adolescent girl, threw a couple of books into the corner when her psychiatrist entered the room. On a previous occasion, she had thrown an ashtray at him. Both therapist and patient recognized the incident with the books as an attempt on Mary's part to refrain from directly attacking the doctor. It seems important to us to recognize such a substitution of an inanimate object for a human target as one step towards the control of aggressive drives. Being content with a symbolic action instead of the immediate goal-directed discharge of tension is taken as a sign that the ego is dealing in a more adequate way than before with the chaotic inner forces. In such cases it seems to us important to allow such a transitional stage to occur. Frequently we see the aggressive child, when restrained or reprimanded for his misbehavior, reacting with righteous indignation because he feels he could have been much worse. For example, Martha, another adolescent girl, was scolded by the nurse for noisily pounding the bathroom door. During the psychiatric interview, she mentioned that the nurse should have been glad it was not her head which Martha was pommeling. We also see that these children spitefully fall back into their old patterns when more is asked of them than they are as yet able to achieve. If we tolerate a compromise situation, we often are in a position to encourage a further step in substi-

tution. For example, the therapist will encourage a child who has reached the verbal stage to use words rather than actions as a medium to express his feelings. He is likely to permit the child to call him a stinker, preferring this to the silent hostility which the same child formerly showed by reading a comic book during the interview.

Permissiveness may be necessary also for other types of verbalization which seem objectively undesirable. The emotionally disturbed child, even more than any other child, is likely to express himself not in straight confession, but by fibbing, bragging, complaining and projecting his own misdeeds onto another child. While the psychiatrist will not pretend to take the tales at face value, he will not confront the child with the discrepancy of his stories. There can be a tacit understanding between psychiatrist and patient, that in talking about another child for example, both really mean the patient, without saying so.

Permissiveness towards an indirect form of communication was helpful in the case of an eleven-year-old girl, Linda, who was actually rejected by her mother and could not trust anybody. She, at first, had refused flatly to have anything to do with her psychiatrist and used the interviews exclusively to order presents which she would refuse when they were offered. She then wanted to talk into the recording machine and to this machine she could tell a great deal about her feelings of being lonely, unwanted, and expecting to be killed or to kill herself.

Permissiveness for tiny steps in the right direction seems important to us when first signs of identification with the therapist appear. They may show up in quite unflattering imitation of the therapist's manners or in appropriating some of his characteristic belongings or sitting in his chair. Considering identification with the parent figure an essential mechanism in maturation, the psychiatrist will not restrain the child from acting out his fantasies before he is able to identify in a more subtle and intrinsic way.

For this process of learning in ego-development—which in psychotherapy we often see like a slow motion picture—we have to make allowances for regression and standing still. Ives Hendrick (2) has pointed out that in learning to control functions, there is a compulsion to practice and to repeat, which is characteristic for the stage of the unlearned function, and that repetition for its own sake disappears when mastery is attained. He has also drawn attention to the fact that the instinct to master—as an inborn drive to do and to learn how to do—is one of the main sources for gaining pleasure during the early years of life. We observe in our patients that learning to control emotions can be a gratification in itself, and can be experienced as a sign of inner strength, alleviating the feelings of helplessness and guilt, which are so frequently the causes of aggressive behavior. We have seen in our patients that permissiveness during the slow intermediate stages of this process is often a prerequisite to experiencing enjoyment of their controlling forces, whereas premature insistence on adequate performance leads to discouragement and giving up.

Summary

An attempt was made to describe the place which permissiveness occupies in psychotherapy with children, not as a principle per se, but as a means

1) to recognize the disturbance underlying the symptoms or the behavior pattern, and
2) to help the child in the process of learning to cope with his fears, fantasies and emotions.

The hazards of unlimited permissiveness, as increasing guilt feelings, insecurity and anxiety, were pointed out. The psychiatric attitude was differentiated from laissez faire or indulgence by

1) the character of the psychotherapeutic interview as a meaningful but "unreal" situation,
2) the special character of the interrelationship between therapist and child, and
3) the use of interpretations based on the child's self-expressions in play, actions and words.

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THE CONCEPT OF MATURITY FROM THE ANATOMICAL, PHYSIOLOGICAL, AND PSYCHOLOGICAL POINTS OF VIEW

A symposium presented at the New York Meeting of the Society for Research in Child Development, December 28, 1949

INTRODUCTION
Lawrence K. Frank, *Presiding*
Caroline Zachry Institute

THE CONCEPT OF MATURITY FROM A MORPHOLOGICAL VIEWPOINT
Wilton M. Krogman, *University of Pennsylvania*

SKELETAL ASPECTS OF MATURITY
William W. Greulich, *Stanford University*

INTELLECTUAL DEVELOPMENT AND PSYCHOLOGICAL MATURITY
David Wechsler, *New York University*

THE IMPORTANCE OF "TIMING" IN CHILD HEALTH SUPERVISION
Samuel M. Wishik, *New York City Department of Health*

INTRODUCTION: THE CONCEPT OF MATURITY

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For many years students in this field have been speaking of child growth, development *and* maturation to indicate an over-all conception of the ongoing processes revealed by the child, or to designate one or more phases of this process. Some are inclined to think that these three terms are redundant. Thus it has been urged that we use the term growth to cover all phases and aspects. Others prefer to say growth *and* development to indicate that the child not only increases in size, shape, weight and other dimensions but also develops various capacities, coordinations and learns various activities such as language.

It has been asked, why add another term such as maturity or maturation unless to indicate the terminal point of growth and development? There seems to be some justification, however, for speaking of maturation as another aspect of these ongoing processes that may be distinguished from both growth and development. The need to explore the meaning and implications of the concept of maturity provided the occasion for this symposium, in order to show what the concept of maturity means as interpreted by different students of child development. By way of introduction to the several papers, the following considerations may be offered as indicating how the concept of maturity, or preferably maturation, might be found useful in this field.

Obviously the human organism is not static; it is changing from the moment of conception all through life. The nature and interrelationships of these changes present the problem to which this Society is dedicated (1). Each one, in accordance with his or her professional training and experience and, may I add, temperament, sees in the changing child a different set of problems to be investigated. Each one brings to the study of that problem his or her preferred methods and techniques and, as we are increasingly realizing, comes with certain assumptions or preconceptions which may not be explicitly expressed but are implied in the statement of the problem, the choice of methods and techniques and the interpretation of the findings.

Thus we may select out various structural, functional and behavioral aspects of the organism-personality for observation and measurement, treating structure as a more or less rigid entity because we measure it at a single moment of time or in dead organisms. We find it difficult to remember that structure, while measured in spatial terms, is not and cannot be

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separated from function measured in temporal terms (2). Thus, we may fractionate the organism-personality and punctuate his ongoing life career by arbitrary stages or steps or epochs. Our studies and findings are frequently classifications of data and by so much we destroy or obscure the over-all organic patterns from which our data have been abstracted. Thus, we overlook the dynamic processes that are producing these larger patterns and are giving rise to these data.

Every such observation and division is purely arbitrary as we select out what we are interested in and try to establish the kind of relationships we believe to be significant.

In child development we need some dynamic conception of the processes operating in the organism-personality which will serve to focus our research upon the life career and help us to realize that most of our observations and measurements today are essentially on the products of the ongoing processes. Thus far we have revealed little of these processes.

We can now say, however, that there appears to be an orderly, regular process of growth, development, maturation, involution and aging which is operating from conception on. It is as if the life career were a broad highway along which every individual must travel.

But we must also say that each individual, with his unique heredity and his nurture (including prenatal nurture), will travel along that highway at his or her own idiomatic rate of progress and will attain the size, shape, weight, capacities, the developmental status which are uniquely his or her own at each stage in the life career. There is order, regularity in the process, but diversity in the products since biological processes, as distinguished from mechanical events, can produce different products at different times, according to when, how and what they operate with or upon. As the French constitutionalist, Sigaud, is reported to have said: A machine will operate only as long as its dimensions are unchanged but an organism can live and function only by constantly changing its dimensions.

Since each organism-personality is engaged in the same processes, is passing through the same sequences of growth and development, we might more fruitfully be concerned with revealing the *equivalents* in organism-personalities which today are either obscured by the search for quantitative similarities or identities or ignored because of our concern for norms and for central tendencies and the relationships between static dimensions.

Here it may be appropriate to recognize what I have called *biological relativity* (3, 5), that every observation and measurement is relative to the specific organism-personality and the field in which it is functioning. As in clinical medicine, every measurement is significant as it is recognized as derived from and relative to the identified individual, his age, sex, life history and present state *and* to all the other measurements on that same individual.

By recognizing biological relativity we may be able to shift our search

from the relation between two variables abstracted from a sample of the population to a concern for the dynamic processes which produce those so-called variables in the identified individual.

From studies now being made we are beginning to recognize that in order to exist and function the organism must continue the processes of growth and development all through life. This takes place through ceaseless replacement of cells, tissues and fluids and, what is more significant, a ceaseless replacement of the chemical constituents of the organism (4).

What we call growth and development, involution and aging, are the products of these dynamic processes of living organisms which operate to maintain a persistent identifiable organism-personality by continuous change. One of the very perplexing questions we face is, what persists through the life career?

Here is where the concept of maturity may be found useful as implying this ongoing process which is revealed partially in what we call indices of growth and development, of involution and aging. Maturation, however, merits recognition and study as implying a dynamic operation which has no terminal point or fixed norms but is continuously and progressively at work. Through maturation the organism-personality persists, but also changes so that we might conceive of maturation as a series of successive *transformations* through time. The organism-personality persists by successive transformations of structure, function, behavior, emotions, whereby he continues to live and carry on his various life activities but with continually changing patterns and dimensions.

If we want to evaluate maturation we may try to assay the adequacy of the organism-personality to function at each successive stage in the life career, using for such evaluation criteria appropriate to each stage and to each unique organism-personality. Adequacy seems to be peculiarly appropriate for assaying the transformations through which the individual must meet successive demands and opportunities in the life career. Immaturity is the persistence of earlier patterns.

Such a conception of maturity will be increasingly needed as we undertake the immense tasks of preventive medicine and of mental health, to which students of child development must make the major contributions. Here we may find that an understanding of what blocks or prevents the individual from changing or transforming as he grows and develops is urgently needed so that in our homes and schools, in our adult activities, we can help the individual to mature in his or her own way.

We also should try to discover whether an individual early in life develops his or her idiomatic way of meeting the demands and opportunities of life and that this early formed idiosyncratic way or pattern governs his or her subsequent maturation. Here child development research may contribute to the social sciences by showing what in our social life, our family life, our schools, our cultural tradition blocks, hampers or impairs the maturation of the individual.

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THE CONCEPT OF MATURITY FROM A MORPHOLOGICAL VIEWPOINT [1]

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The word "maturity," and its twin, "maturation," are two of the most loosely-used, poorly-defined, and overworked terms in the English language, ranging from biological "cell maturation," through cultural "mature behavior," to economic "value of a bond at maturity." The terms are, it seems, all things to all people.

In the present discussion we shall focus upon the use of maturity in growth studies, and shall limit ourselves in principle to somatic or morphological considerations. For the most part we shall consider quantity rather than quality, i.e., we shall assess categories of measurements and dimensionalities that may be utilized in setting up standards of morphological maturity.

Although Dr. Greulich will consider "Skeletal Aspects of Maturity," we cannot avoid a mention of this aspect in the present discussion, for the skeletal system is, after all, an integral and basic part of the morphology of the individual. Furthermore, so many estimates of morphological maturity are predicated upon skeletal advancement that we can scarcely divorce the one from the other. We shall discuss skeletal progress as a procedure, rather than as a concept.

The morphological role of the skeleton is best qualified by Todd (23) in the statement that "skeletal age is not a goal in itself, but is employed as an indicator of bodily maturity."[2] The so-called "Todd inspectional method," utilizing standard age-norms for hand X-rays, is too well known to need further elucidation. In his 1946 study of the development of strength Jones used skeletal X-rays as the basis of maturity ratings. Bayley (2) states that the analysis of skeletal development has provided us with "standards which allow for significant differentiation of skeletal maturity." To which she added that "skeletal age is . . . an indication of relative physical maturity, and complete closure of the epiphyses represents mature or adult physical status" (3).[3]

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[1] Delivered at the Symposium on the Concept of Maturity from the Anatomical, Physiological, and Psychological Points of View at the meetings of the Society for Research in Child Development, New York, December 28, 1949.

[2] In 1931 Todd (22) used "skeletal maturity" and "skeletal differentiation" synonymously. McCloy (12) refers to "anatomical age or skeletal maturity"; he also refers to "physiological or maturational age."

[3] In a sense Cattell (5) follows this principle, though she uses progressive maturity to refer to the relative amount of bony tissue in the growing hand.

The use and interpretation of the skeletal X-ray as an estimate of maturity is not simple. Though a standard age-rating is suggested by Todd's *Atlas* (27), Pyle and her associates (13) consider the Todd inspectional technique principally as a method of estimating "the uniformity of maturation in regions of the skeleton." In 1942 Buehl and Pyle (4) stated that skeletal age, as a maturity category, must be "based on an aggregate of multiple maturity determinators." In 1943 Simmons and Greulich (20) concluded that "ideally a skeletal assessment would be a rating of simple maturity, uncomplicated by the growth factor ... but it is undoubtedly inevitable that, in the estimation of skeletal maturity, growth enters to some unknown extent."

The foregoing paragraphs bring to focus the problem of the relation of growth, per se, to maturity: can they be regarded as distinct? or are they complementary? or even synonymous? Todd (23) states as follows: "This business of growing up, growing older, growing old, is quite different from that of growing: it implies progressive maturity, not increasing dimensions." Simmons and Greulich (20) endorse this in principle when they conclude that "the maturational process differs from the growth process, and changes in skeletal development are, by observation, of a different nature from changes in size."

The use of the skeleton as an estimate of morphological maturity is, it seems, a basic technique. The skeleton is, of course, grossly correlated with growth in size; the skeleton gets bigger (i.e., the bones get longer, thicker, heavier), but this, alone, is but one phase of progress toward maturity. *Quantity*—mere size—is not enough. Something else is happening in the skeleton, something which may more appropriately be called a *quality*—progress toward an ultimate (adult) condition. In this sense, then, we use skeletal age, not as a correlate, but as a measuring unit, a standard, against which all morphological (including dimensional and observational)[4] maturity can be measured. The basic conceptual framework of skeletal maturity must be established in Dr. Greulich's paper.

Morphological maturity can be related to the growth process, per se, irrespective of any possible correlation with skeletal advancement. Todd (23) regarded skeletal age, height, and weight—in order—as the three best measures of "physical developmental growth" during childhood. Simmons and Greulich (20) refer to "certain maturational indicators, viz., chronological age at menarche, assessment of skeletal maturation, and standing height and body weight, together with their annual increments." In another context, however, they point out that "stature and weight are themselves variables at [sexual] maturity." McCloy (12) relates maturity levels to growth when he says that the "spurt in physical growth" is related to "maturation of the gonads."

[4] We are implying a dichotomy between measurement of size and proportions and the estimate of degree of change (as in secondary sex traits, for example).

The single, most often used estimate of morphological maturity is the adult value (of a dimension) or status (of a functional system). Scammon (9) employed this technique in his famed four patterns of growth (neural, lymphoid, general, genital). He used the attained value (dimension or weight) at 20 years of age as the adult, or 100 per cent value. Hence, this becomes the "mature" value, and chronological age-stages may be expressed in percentage terms toward maturity, i.e., the assumed "adult" or terminal value.

Wetzel (24, 25, 26) has built this concept of morphological maturity into his "Grid for Evaluating Physical Fitness." One of his three basic aims is "to measure and help guide individual progress from infancy to maturity" (25). There is a tacit beginning-to-end (infancy-to-adulthood) sequence.[5] Wetzel's rating of maturity is "the percentage level reached with respect to ultimate level, as determined by the upper level toward which the auxodrome in question is proceeding" (26). Here is an example of how it works: a boy, aged 12½ years, is at developmental level 150, on the 2 per cent auxodrome; since this auxodrome attains level 190 at 18 years (the 100 per cent or "adult" value), the boy at 12½ years is 150/190, or 78.9 per cent toward his maturity goal. Wetzel goes even farther when he recognizes that the attainment of maturity (the adult level) is relative, dependent upon the speed of the growing child: while a child on the 2 per cent auxodrome will achieve level 190 at 18 years, a child on the 98 per cent auxodrome need achieve only level 148 at 18 years. Yet at 190 and 148, respectively, each achieves his own mature rating.[6] Simmons and Greulich (20) endorse in principle the concept of the adult value as an index of maturity when they speculate upon "how far a child has progressed toward his own mature height." Bayley (2) uses the phrase "per cent of mature size" in setting up categories of predicting adult size ("complete growth"); again, she states that "among boys of the same chronological age the skeletally more mature boys are nearer their own mature size, the immature less so."[7]

Perhaps the most widely used concept of morphological maturity is that of puberty. There are, of course, physiological factors involved here, but we are referring only to concomitant bodily changes. Puberty is the time of sexual ripening and all that it implies. Richey (15) states that the onset of puberty is the standard of maturity, to which Abernethy (1) adds, "Age of onset of puberty is the most important index of general maturing,

[5] As early as 1908 Crampton (6) accepted the adult level as that of maturity when he defined adolescence as extending "from puberty to maturity."

[6] In the same vein, though expressed negatively rather than positively, Todd (23) stated that "retarded maturation is expressed in infantilism of bodily form, of face, and of behavior."

[7] West, quoted by Shuttleworth (18), employed the principle of the approach to the adult value when he assumed 12 measurements of the carpal X-ray in percentage of "mature development."

either physical or mental." Wetzel (24) builds his entrie concept of maturity around the advent of puberty.

The morphological definition of puberty centers around the complex of so-called secondary sex traits, i.e., the outward manifestations of dominance in maleness and femaleness. In this discussion we need not elaborate upon the cataloguing of the several traits;[8] it will suffice to note only certain basic data: onset of menarche, breast development, and general hirsute development. Richey (15) based his studies on the menarche in the female and the appearance of axillary hair in the male. Reynolds (14) states that in his study "sexual maturation was defined in terms of breast development."[9] Shuttleworth (17) states that "the process of sexual maturation in girls begins with the budding of the breasts, the appearance of pubic hair, and after some time culminates in the first menstruation or menarche." For boys a very careful and relative analysis (see Table I) is that of Greulich and his associates (8), who set up "five maturity groups which represent successive stages in the transition from the degree of physical immaturity which exists just before puberty to the degree of maturity which is usually associated with late adolescence." To the criteria of Table I must be added the skeletal evidence of Buehl and Pyle (4) who used three ossification centers (ulnar age, sesamoid age, iliac age) as a "measure of maturity" and as "a point in the maturation cycle of the male." It is important to note that the Greulich study, and to a lesser extent, that of Buehl and Pyle, recognize the relative nature of the attainment of maturity; the process is fairly orderly and regular; time of achievement may vary with growth pattern.

This quite logically—although not in an absolutely clear-cut manner—takes us from *maturity* as an end-product, an achieved state, to *maturation* as a process, as a series of way-stations along the path toward a final (adult) condition. There can be no reasonable doubt of the inevitability of morphological maturity; all things being normal, there must come a time when the process of growth reaches a terminus, a time when adult, or "mature," values are reached. There are still, however, certain residual problems relating to maturation, or the act of achieving maturity.

In 1937 Todd (23) wrote that "the maturation process ... depends ... upon general constitutional fitness, rather than upon the influence of a single controlling factor." Wetzel (24) feels that the maturation process is related to an inherent impulse to growth when he writes that "maturation is not directly related to age or to size, but rather to a more fundamental and critical property, viz., maximum deceleration of growth and

[8] Reference may be made to, among others, the studies of Crampton (6), Greulich (7), Greulich et al. (8), Kubitschek (11), Scheidt (16), and Shuttleworth (19).

[9] He found breast buds at 10.7 ± 1.1 years, pubic hair in girls at 11.2 ± 1.1 years. In girls McCloy (12) reported pubic hair at 13 years, 8 months, and for boys at 14 years.

development, and through this only indirectly to age." Maturation, is, in the sense of the foregoing, the *quality* of achieving maturity, which, in turn, may be rated as an ultimate *quantity*.

The problem of reliability of techniques and definition of process and status is a contradictory one. Stevenson (21) speaks of "the essential reliability of epiphyseal union as an indicator of [skeletal] age." Todd (23)

TABLE I

MATURITY GROUPS IN BOYS

(Greulich, et al., (8))

Group	*Penis, testes, scrotum*	*Pubic hair*	*Facial hair*	*Circumanal, perineal hair*	*Axillary hair*
1	Size as in early childhood	Pubic vellus as on ant. abd. wall	Only down hair	none	none
2	Penis longer, testes larger	Vellus developed into pigmented downy hair lateral to base of penis	As in group 1	none	none
3	Penis still longer, testes larger	Vellus continues development seen in group 2	Lightly pigmented hair at corner of lips and in front of ears in over ½ boys	Present in a few	Small hairs present in a few
4	Penis larger, especially in diameter, testes larger	Pubic hair like that of adult, though not so extensive	Slightly more developed than in group 3; slight hair on upper lip	Present in most	Present, though not as numerous as in adult
5	Are at max. size for the individual	Adult in quantity and type, and frequently in masc. pattern	Conspicuous hair on upper lip and sides of face and chin	Present, well developed	Present, well developed

states that "maturation is far less subject to fluctuation in progress than is growth." Simmons and Greulich (20), however, feel that none of the indicators of maturity "may be considered as an entirely satisfactory criterion." Specifically, they regard the menarche as "neither a dependable criterion of maturity, nor as necessarily the expression of any narrowly circumscribed stage of sexual maturation."

It is pretty clear up to this point that maturity, in a morphological sense, is an attained state, and that maturation is a phase, a time-linked aspect, of that state. It is equally clear that there are several indicators of maturity

and that there are, during growth, at least two great moments in the achievement of maturity—puberty and adulthood; the former is basically physiological (though it "triggers" certain morphological changes), the latter basically morphometric (size) and morphological (descriptive traits).

In a larger framework of biologic thought we would like to suggest that maturity is, in a sense, a climax of a biogenetic process; in this vein it may be considered as a never-ending series of climactic events in the life cycle of the organism. Therefore, the definition of maturity must shift with the stage or level of development unfolding that, in broadest aspect, we may call *organic growth*. Maturity, as a biological concept, thus becomes an aspect of the process of physical growth: it may be morphological, physiological, biochemical. It is rarely only one; it is generally all three, wellnigh inseparable.

If we accept the above premises, then, "maturity" need not cease with "growth," i.e., with the final cessation of bone growth that gives adult size, proportion, and configuration. We are suggesting that maturity applies with equal vigor and validity to the age-changes that supervene after adulthood is achieved (i.e., after about 21 years).[10]

The epiphyses of the long bones are said to be mature when there is synostosis at the epiphyseo-diaphyseal plane. This is at about 21 years; there are a few epiphyses left to unite, e.g., vertebral centra, scapular border, iliac crest, sternal end of clavicle, but practically speaking 20–21 years represents the attainment of skeletal maturity.

We see no valid reason why the same kind of thinking should not be extended to other morphological criteria of age in the human body, especially those best-known in the skeleton. The closure of the skull sutures is perhaps the best example of a maturation process that is often spoken of as simply an "age-change," rather than considered as part of the organic growth process. Yet the process of closure in sutures does not differ basically from that of epiphyseal union. There is no logical reason why we cannot speak of a patent suture as "immature," a closed suture as "mature." It is the ultimate destiny of a suture to synostose no less than it is of an epiphysis to unite with its diaphysis. Why, then, limit the concept of morphological maturity to only that period of life customarily spoken of as the "growth period?"[11] What of "growing old and growing older," to borrow from Todd's trichotomy?

Age-changes in the human body after the attainment of the adult state

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[10] In the first two decades of life the dental system comes to maturity: the teeth calcify and erupt. It is not unfair to say that the deciduous teeth are "mature" at about 36 months—they have fulfilled their destiny up to the point of complete growth in form, size, and function. Their subsequent exfoliation may therefore be said to be "postmaturational."

[11] To suture closure we might add the progressive definition of the pubic symphysis, and the architectural and textural changes of bones, especially on articular surfaces.

represent, for the most part, what we could call a "more mature" aspect of organic aging. It is true that very often the age-changes of later years are involutional and "senile," but then—and mayhap we belabor the point—so is a united epiphysis. The role of organic growth is ever from immature to mature; biologically speaking time has no value in the process. It is something that is morphogenetically bound to occur, and it *does* occur throughout the life cycle of each individual organism. It is time-linked only in the sense that progress to maturity is at different rates, and therefore occurs at different points in the chronological age-scale. A suture may be immature when an epiphysis is mature; bone texture may be immature when a suture is mature, and so on. The *process of maturation* is always going on in human tissues, leading to the ultimate *status of maturity* of each different structure.

The concept of morphological maturity is a difficult one to define within the bounds of sidereal time or organic structure. It is linked with biologic age and it is an expression of the growth potential of all tissues and systems. The process of aging we call *maturation;* the termination of that process—whenever it occurs in the life-cycle—we call *maturity*. These premises, we think, are basic to organic life.

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THE RATIONALE OF ASSESSING THE DEVELOPMENTAL STATUS OF CHILDREN FROM ROENTGENOGRAMS OF THE HAND AND WRIST[1]

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THE NEED FOR A DEPENDABLE METHOD OF DETERMINING THE PHYSICAL DEVELOPMENTAL STATUS OF CHILDREN

The establishment of well-baby clinics and school health programs, and the routine health examination of children increasingly requested by parents have created a need for a body of information about the normal growth and development of infants and children that would be comparable to what is now known about the diagnosis and treatment of the illnesses to which they are subject. One of the needs thus created is for a method which will provide more precise information about the developmental status of the child than can properly be inferred from its height, weight, and age alone.

THE LIMITATIONS OF HEIGHT-WEIGHT-AGE TABLES FOR THIS PURPOSE

We measure and weigh children in order to determine how their height and weight compare with those of others of the same age and sex. If we find that a child is about as tall and as heavy as the average of his contemporaries, we usually assume that his development is proceeding satisfactorily. If we, in this country, were more homogeneous genetically, this assumption might be more generally valid than it now is. As a people, however, we are very heterogeneous in national and, to some degree, in racial origin. Even among the White population of this country, there are such diverse types as short-statured Mediterranean people, taller, heavier Scandinavians, and more moderately sized people of Central European origin, to mention only a few. In addition, and perhaps more important, there is almost every possible mixture between these and the numerous other strains that compose the population of the United States. It is this genetic diversity plus significant differences in nutritional level that are largely responsible for the fact that, in this country, height-weight-age tables, while fitting the particular group of children on whom they were originally based, are seldom wholly satisfactory when applied to other groups.

[1] This paper which is an excerpt from Greulich and Pyle's *Radiographic Atlas of Skeletal Development of the Hand and Wrist*, just published by the Stanford University Press, Stanford, California, was delivered at the Symposium on the Concept of Maturity from the Anatomical, Physiological, and Psychological Points of View at the meetings of the Society for Research in Child Development, New York, December 28, 1949.

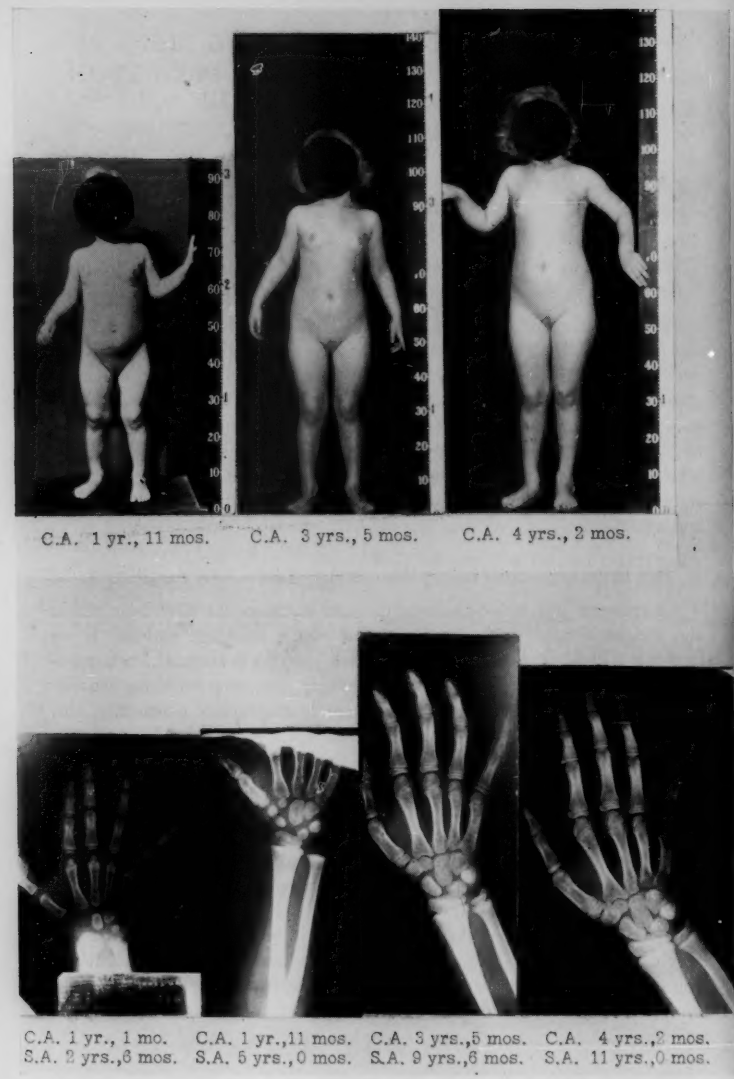
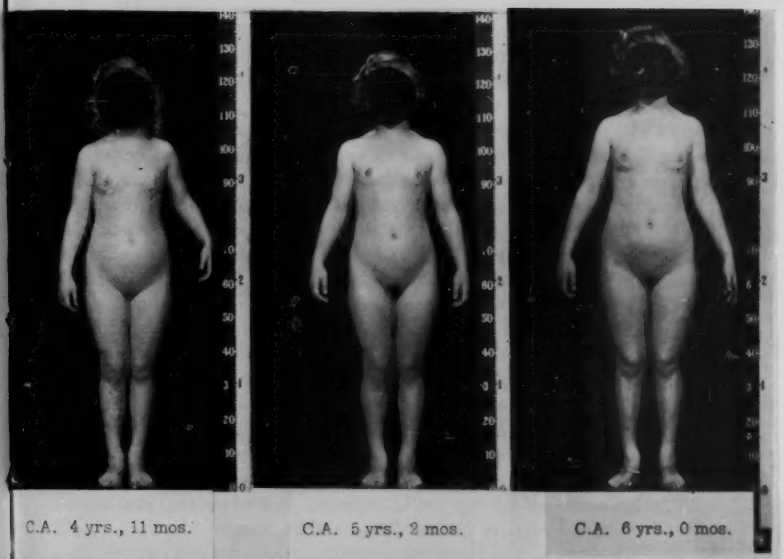
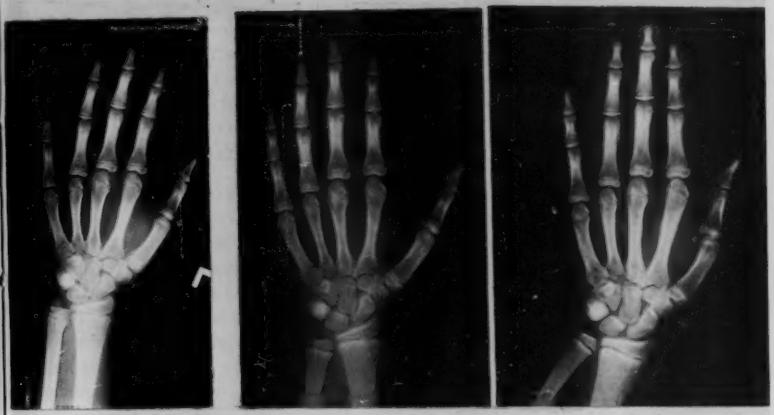

C.A. 1 yr., 11 mos.
C.A. 3 yrs., 5 mos.
C.A. 4 yrs., 2 mos.
C.A. 1 yr., 1 mo.
S.A. 2 yrs.,6 mos.
C.A. 1 yr.,11 mos.
S.A. 5 yrs.,0 mos.
C.A. 3 yrs.,5 mos.
S.A. 9 yrs.,6 mos.
C.A. 4 yrs.,2 mos.
S.A. 11 yrs.,0 mos.

FIGURE 1

The accelerated skeletal and general bodily development of a girl with precocious puberty whose first menstruation occurred when she was



C.A. 4 yrs., 11 mos. C.A. 5 yrs., 2 mos. C.A. 6 yrs., 0 mos.



C.A. 4 yrs., 11 mos. S.A. 12 yrs., 9 mos. C.A. 5 yrs., 2 mos. S.A. 12 yrs., 11 mos. C.A. 6 yrs., 0 mos. S.A. 13 yrs., 6 mos.

seven months old. (C.A., chronological age; S.A., skeletal age.) (Courtesy of Drs. Harold K. Faber and Leona M. Bayer, Stanford University School of Medicine.)

There is another factor which makes it difficult to determine the developmental status of children from their height, weight, and age alone. The existence of early maturing as well as late maturing strains in our population makes for a wide difference in the age at onset of puberty and, consequently, in the age at which the maximum annual increment in height —the so-called preadolescent spurt of growth—occurs. Because of this variability, the chronological age of a child during the early part of the second decade of life is often but little more than a measure of the length of time that he or she has lived; it bears no necessarily close relationship to the amount of progress which the child has made toward attaining adulthood.

The difficulties which these and other variables of bodily growth create for those who attempt to appraise the developmental status of children have led to a search for some dependable indicator of maturity which would, within reasonable limits, be independent of bodily size. The developmental status of the skeleton as disclosed by an X-ray film of the hand and wrist appears to meet this need. Let us consider some of the evidence on which this assertion is based.

The Relationship of the Developmental Status of the Skeleton to that of the Reproductive System

Growth manifests itself by an increase in mass and volume as disclosed by an increase in weight and by changes in external dimensions as the child advances in age; development is the expression of those processes by means of which it becomes progressively more mature. While growth and development proceed concomitantly in the normal child, they are to some degree potentially independent processes. This is clearly evident in such contrasting pathological states as precocious puberty and marked hypogonadism or eunuchoidism.

A. *Precocious puberty.*

Figure 1 shows some of the externally discernible bodily changes which took place over a period of four years and one month in a girl with precocious puberty whose first menstrual period occurred when she was seven months old. Immediately below each photograph is a copy of the hand X-ray film which was made at the same time (the first X-ray film shown in the illustration was made some months before the earliest photograph was taken). The abnormal acceleration of this child's skeletal development is indicated by the greatly advanced skeletal ages assigned to her successive hand-films.

In this as in other similar cases, a single X-ray film of the hand discloses the abnormally advanced skeletal development and enables one to determine the degree of the child's precocity. If such hand-films are repeated at intervals over a period of months or years, they provide also an objective measure of the rapidity with which the child's skeletal devel-

opment is proceeding, from which it is usually possible to predict when epiphysial fusion will occur in the long bones of the lower limbs and in the vertebral column and when, consequently, growth in height will cease.

This child was quite tall as compared with normal girls of her age when the precocious developmental changes began to manifest themselves and her growth has continued at an abnormally rapid rate to the present time. In such children, however, growth ceases very early in life and they end up abnormally short. This is consistent with the known relationship between certain sex hormones and growth, especially growth of the long bones, which is principally responsible for increase in stature. Numerous observations on the growth of children have conclusively shown that the growth of the long bones begins to decelerate at about the time of puberty and that it terminates soon thereafter.

In precocious puberty, the gonadal and related hormones are present abnormally early in quantities sufficient to cause the various epiphyses to fuse before growth has continued long enough to permit the attainment of full normal, adult stature. This will, quite probably, be true of this child; for epiphysial fusion had already begun in the distal phalanges of her thumb and of her third and fourth fingers, when she was examined at the age of five years and two months. This stage of skeletal development occurred usually between thirteen and thirteen and one-half years in the girls of our Research Series—about eight years later, therefore, than in this unfortunate child.

B. *Hypogenital states.*

In hypogonadal males and in females with comparable gonadal inadequacies, growth, especially growth of the upper and lower extremities, continues for an abnormally long period of time and results in characteristically eunuchoidal bodily proportions, in which the limbs are abnormally long and the trunk disproportionately short. Such a hypogonadal male is shown in Figure 2. A marked retardation in skeletal development appears to be a constant feature of this distressing syndrome. Here again, an X-ray film of the hand enables the physician to assess the degree of skeletal retardation present in the patient and to determine whether or not further increase in stature will occur. It also provides a means of gauging the effectiveness of endocrine or other therapy designed to palliate the condition.

The subject shown in Figure 2 was twenty-two years old when the photograph and the accompanying hand-film were made. It will be noted that some of the metacarpal and phalangeal epiphyses have not yet fused with their shafts, despite the fact that such fusion usually occurs at about sixteen years of age in normal boys. Thus, the incomplete maturation of the reproductive system present in this case is reflected in a corresponding retardation in the skeletal development of the hand, just as the advanced sexual development of the girl with precocious puberty was associated with

a comparable acceleration in skeletal development. The correspondence between the developmental status of the skeletal and reproductive systems is equally close in children who are free from such defects.

C. *Normal Girls.*

In normal girls, there is a rather constant relationship between the time of occurrence of the menarche, the first menstruation, and the time at which the maximum annual increment in height takes place. In the majority of those enrolled in our Research Series, for example, the maximum annual increment in height occurred during the year preceding that in which the menarche took place. The relationship between these two processes is shown graphically in Figure 3, in which the mean annual increments in height of eight menarcheal age groups of girls are related to the

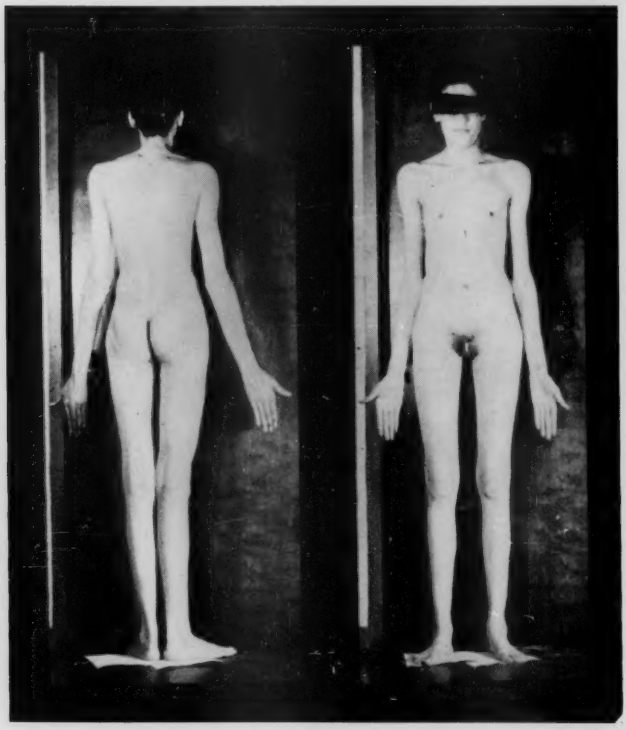


FIGURE 2

Retarded skeletal development associated with eunuchoidal bodily propor-

tions in a twenty-two-year-old male with genital hypoplasia. (Courtesy of Dr. James B. Hamilton, Long Island College of Medicine.)

time of their menarche. The curves are arranged so that the point on each at which the menarche occurred touches the same vertical line. This makes it possible to compare directly the growth curves of the various groups of girls regardless of differences in their chronological age at the time of their first menstruation.

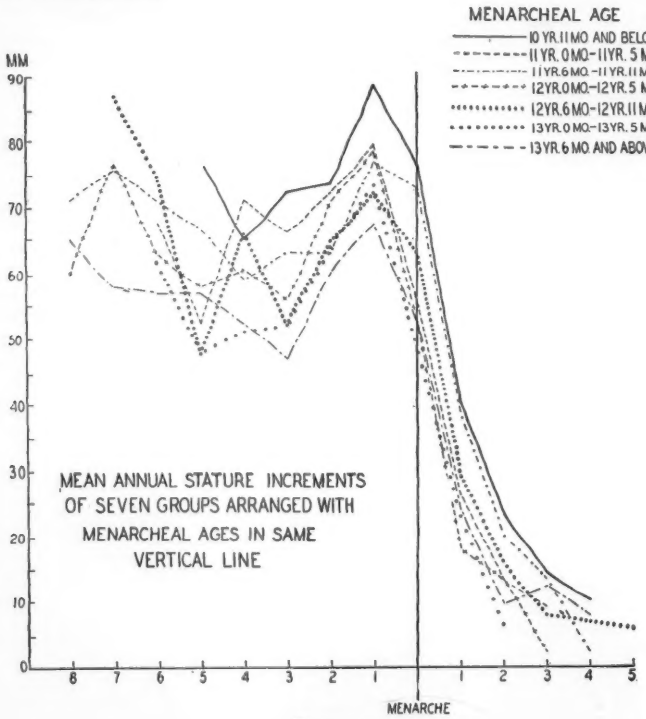


FIGURE 3

The numbers on the abscissa to the left of the vertical line indicate years before the menarche; those to the right, years after the menarche.

It is evident from this and from other similar observations that, by the time the maturation of the ovaries and of the other reproductive organs has attained a level at which menstruation is possible, the rate of growth in stature has already begun to decelerate. This deceleration is due principally to changes in the long bones of the lower limbs which precede, usually by only a short period of time, the obliteration of their epiphysial cartilages, the fusion of the epiphyses with their shafts, and the consequent cessation of their growth in length.

The skeleton of the healthy, adequately nourished child develops as a unit and its various parts tend to keep pace with each other in their maturation. It results from this that the developmental status of the bones of the lower limbs can usually be inferred from that of the hand and wrist alone. So intimate is the correspondence between the maturative changes in the reproductive and in the skeletal systems that it is often possible to predict when the menarche will occur from an examination of an X-ray film of the hand and wrist, during the prepuberal period. In most normal girls on whom such observations have been made, the menarche occurred be-

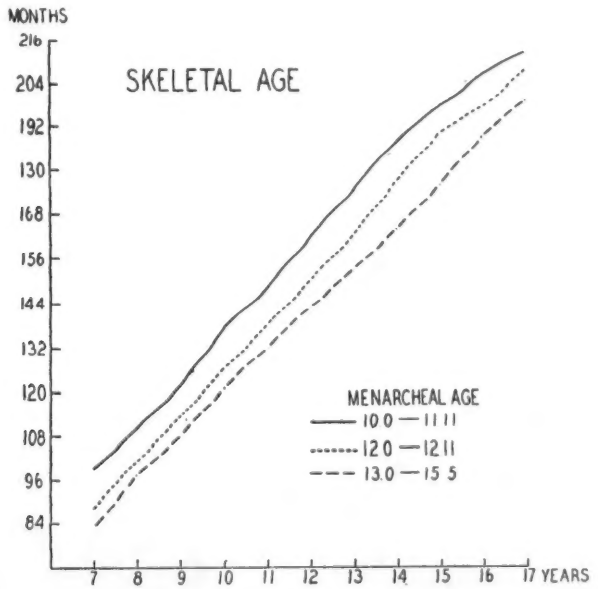


FIGURE 4

The mean skeletal age of each of three groups of girls from our Research Series whose relative skeletal status even in early childhood indicated quite accurately the order in which they subsequently attained puberty.

tween the beginning and the completion of epiphysial fusion in the phalanges—usually soon after the fusion of the epiphyses of the distal phalanges with their shafts.

The skeletal status of the hand as revealed by the X-ray film often enables one to distinguish, some years before puberty, between children who will mature early and those in whom maturation will be longer de-

layed. In Figure 4 are shown curves of the mean skeletal age of each of three groups of girls from our Research Series whose relative skeletal status even in early childhood indicated quite accurately the order in which they subsequently attained puberty. In that study skeletal age was found to be more highly correlated with menarcheal age than was standing height, weight, weight-height index, or annual increments in standing height (1).

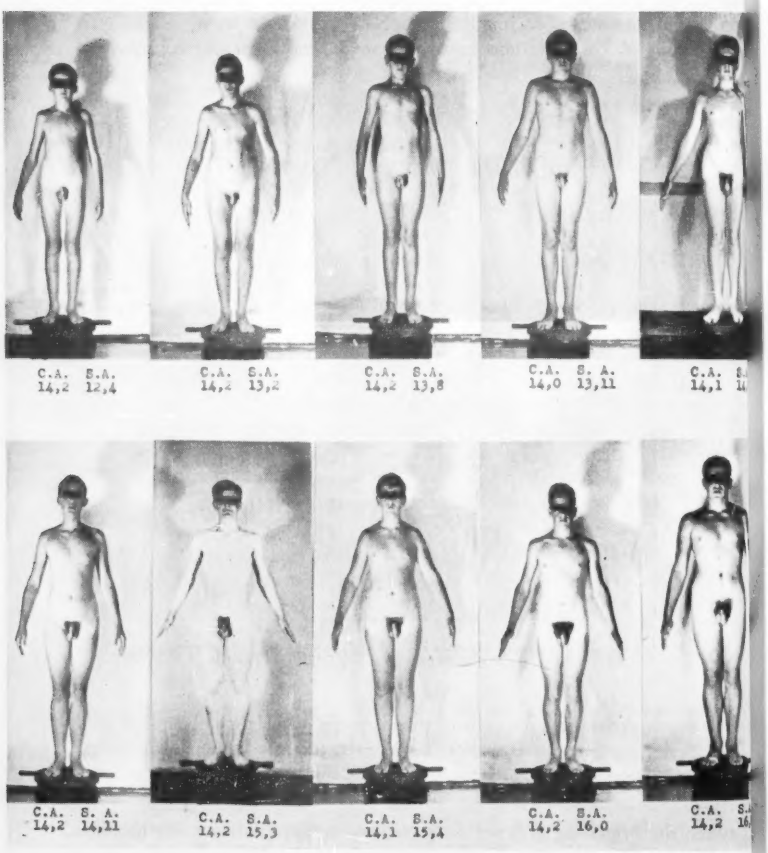


FIGURE 5

The close correspondence of skeletal age to the degree of general bodily maturity in a group of puberal boys. (C.A., chronological age; S.A., skeletal age.) (Courtesy of Dr. J. Roswell Gallagher, Andover, Mass.)

Girls of early, average, and late menarcheal age groups could be differentiated by the assessment of their skeletal maturity prior to the menarche or the premenarcheal acceleration in height and weight.

D. *Normal Boys.*

The appearance of pubic and axillary hair and of other secondary sexual characters, together with growth changes in the external genitalia, reflect progressive stages in the sexual maturation of boys. In boys, too, these puberal changes are accompanied or preceded by the maximum annual increment in stature, though it usually occurs from about one and one-half to two years later than in girls of the same population.

The chronological age of boys when they reach puberty is quite as variable as that of girls, due to both genetic and environmental factors. This variability is strikingly illustrated by the photographs reproduced in Figure 5. The boys shown were either 14 years; 14 years, 1 month; or 14 years, 2 months of age when the photographs were made. Despite their similarity in chronological age, they ranged from early prepuberal to a slightly sub-adult stage of development. When the photographs were arranged in an ascending order of maturity on the basis of the boys' external appearance, it was found that their skeletal ages (S.A. in the Figure) formed a continuous series from the least mature to the most mature member of the group. This is another illustration of the close relationship between the developmental status of the reproductive and skeletal systems as disclosed by an X-ray film of the hand and wrist.

The Relationship of the Developmental Status of the Reproductive System to the Degree of General Bodily Maturity

Implicit in all of this is the assumption that the degree of development of the reproductive system is a reliable indicator of the level of general bodily maturity. We believe that this is a valid assumption.

The changes in the skin and its accessory structures which occur during puberty and early adolescence—the development of the breasts, of the pubic and axillary hair, and of the apocrine sweat glands; the changes in the amount and distribution of subcutaneous fat; and the development of the other secondary sexual characters are all controlled primarily by the gonadal and related hormones. Their developmental status is, consequently, determined by that of the reproductive system.

The growth of the skeletal muscles is also very closely related to the functional status of the testes, for, as Papanicolaou and Falk (2) have shown, androgenic substances have a specifically stimulating effect upon them, in laboratory animals. That a similar endocrine mechanism operates in boys seems highly probable, since the muscles of their limbs and trunk increase markedly in size soon after the puberal growth and maturation of the testes begin.

Skeletal Status and General Bodily Maturity

It is the degree of development of anatomical characters such as those just enumerated upon which an estimate of the degree of physical maturity of an adolescent boy or girl is usually based. Since the status of those characters is so closely dependent upon that of the reproductive system, the latter alone provides a useful index of general bodily maturity during that period. The skeleton, in turn, reflects the developmental and functional status of the reproductive system and provides an even more useful measure of the body's general level of maturation since it can be employed for that purpose throughout the period from birth till the completion of skeletal development—therefore, both before and after the very brief period during which an assessment of general developmental status could be based on the degree of development of the primary and the various secondary sexual characters.

One gets the impression that, at least in health, the development of the child proceeds harmoniously in all of its parts. To the extent that it shows detectible evidences of progressive maturation, any organ system could, presumably, be used for determining the developmental status of the organism as a whole. The skeleton, however, especially that of the hand and wrist, has the following very great advantages for this pupose: the changes associated with progressive maturity are readily visible in the X-ray film; they occur in an orderly sequence; they cover the entire period from birth to early adulthood; they permit the direct comparison of children without regard to genetic or other differences in bodily size; and, as pointed out above, the maturative changes in the skeleton are very intimately related to those of the reproductive system which, in turn, are directly responsible for most of the externally discernible changes on which the estimation of general bodily maturity is usually based.

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2. Papanicolaou, G. N., and Falk, E. A. General muscular hypertrophy induced by androgenic hormone. *Science*, 1938, 87, 239.

INTELLECTUAL DEVELOPMENT AND PSYCHOLOGICAL MATURITY [1]

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In discussing the problem of intellectual maturity, or indeed psychological maturity in general, I think it is important first to define maturity and second to differentiate between what one may call substrate and behavioral evidences of maturity. As regards intellectual abilities, one can define maturity operationally as the attained level of psychological functioning beyond which measures of performance no longer increase significantly with age. This definition circumvents, to be sure, the question of integration as an aspect of maturity but it only restates, I believe, the assumption underlying most objective measures of intellectual functioning, at least as regards specific abilities. In any event it is the one which I shall use in discussing the data in this paper.

The second distinction is not so generally made and perhaps would not be altogether acceptable to workers in the field. By substrate aspects of maturity I mean those segments of mental and other allied functions which develop relatively independent of training and special education. Thus, walking and talking would be substrate abilities, whereas riding a bicycle and language facility would be behavioral. In the case of the higher functions the distinction between substrate and behavioral performance is not so easily made. For example, it is difficult to determine to what degree arithmetical reasoning as measured by tests is a manifestation of sheer native ability and to what extent it is due to training and instruction. Another difficulty in evaluating intellectual ability, especially in the early ages, is our lack of unequivocal measuring rods or tests. It is important to distinguish between our inability to measure a given function and an implied absence of that ability merely because we are unable to elicit it by the means at hand. Thus, if we restrict ourselves to a similarities test as a measure of abstract reasoning ability then we might conclude that children below six or seven years are incapable of abstract reasoning because, in point of fact, average children under that age are unable to give likenesses or differences. Children under that age are, of course, capable of certain types of abstract reasoning and certainly of generalization, but it is almost impossible to devise a simple series of tests which would continuously measure the function and thereby enable us to say precisely at what age below five the ability first emerges.

Psychologists and others have for a long time sought to discover at

[1] Delivered at the Symposium on the Concept of Maturity from the Anatomical, Physiological, and Psychological Points of View at the meetings of the Society for Research in Child Development, New York, December 28, 1949.

what age a child can do what things, but this has been mostly at the descriptive level. Such descriptions are, of course, of some value and Gesell's books may be cited as illustrations of their usefulness, but on the whole contribute little to the maturation problem which confronts us because they are concerned primarily not with questions of basic abilities, as such,

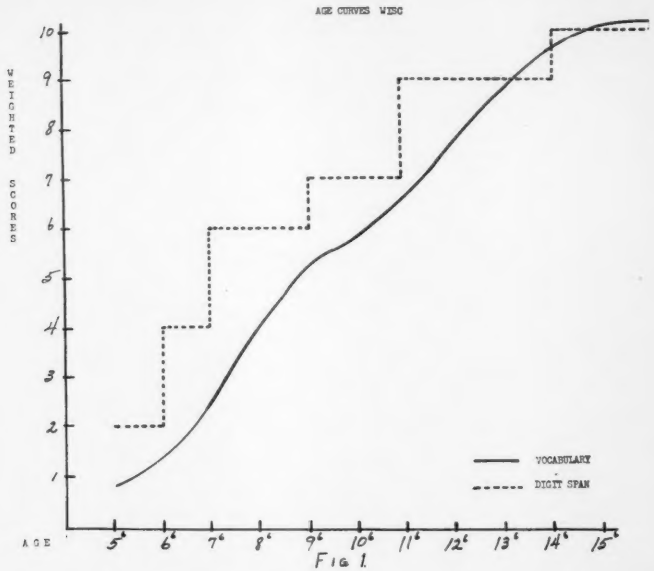

FIG 1

but with their behavioral aspects. The material which I wish to present deals with none of these but with intellectual functions that can and have indeed been measured continuously over a considerable span of the child's life. Much data are already available in this field but the material which I wish to present as a basis for our discussion is data derived from the recent standardization of the Wechsler Intelligence Scale for Children (WISC) which covers the ages from 5 to 15 years.

The Scale consists of 12 equated tests which may be said to involve as many different, though to a considerable degree overlapping, intellectual abilities. Since the tests have been equated not only in terms of equivalent units of amount, but also in terms of equivalent age scores, it is possible to appraise maturity levels in terms of the degree to which performance at any given age approximates the score of the age beyond which mean scores no longer increase. Year 15 has been provisionally chosen as this age. Curves of growth have been established by transmuting raw scores of mean performance at every age into weighted scores for year 15. This was

done for all the tests of the Scale. Figure 1 illustrates type of curves obtained. The unbroken curve shows the increase of vocabulary with age, the broken line that of memory span for digits. Table I gives the transmuted scores for all tests (at four-month intervals) from which the curves of growth of the remaining functions may be derived.

TABLE I

WEIGHTED SCORES AT MEAN OF EACH AGE WHEN BASE OF COMPARISON IS EQUIVALENT STANDARD SCORE OF 15–4 TO 15–7

Inf.	*Com.*	*Ar.*	*Sim.*	*Voc.*	*D.Sp.*	*Test Age*	*PC*	*PA*	*Bl.D.*	*O.A.*	*Code*	*Maze*
½	1	½	1	¾	2	5– 2	3	½	½	½	—	2
½	1	½	1	¾	2	5– 6	3	1	½	1	—	2
1	1	1	2	1	2	5–10	3	1	½	2	—	2
1	1	1	2	1	2	6– 2	3	1	½	3	—	2½
2	2	1	2	1	4	6– 6	4	2	2	3	—	3
2	2	2	3	2	4	6–10	4	2½	2	3	—	3
2	2	2	3	2	4	7– 2	4	3	3	4	—	3½
2	3	2	3	2½	6	7– 6	5	3	3	4	—	4
3	3	3	3	3	6	7–10	5	4½	4	4	—	4
3	4	3	3	3½	6	8– 2	5	5	4	4½	3	4½
4	4	4	4	4	6	8– 6	5	5½	4½	5	3	5½
4	5	4	4	4	6	8–10	5	6	5	5	3½	5½
4	5	4	5	4	7	9– 2	6	6	5	6	3½	7
4	5	5	5	5	7	9– 6	6	6½	5½	6	4	7
5	5	5	5	5	7	9–10	6	6½	5½	6	4½	7
5	6	5	6	5	7	10– 2	7	7	6½	6½	4½	8
5	6	6	6	5½	7	10– 6	7	7	6½	6½	5	8
5	6	6	6	6	7	10–10	7	7½	6½	6½	5	8
6	7	7	7	6	9	11– 2	8	8	7½	8	6	9
6	7	7	7	6½	9	11– 6	8	8	7½	8	6½	9
6½	7	7	7	7	9	11–10	8	8	7½	8	6½	9
7	8	8	8	7½	9	12– 2	8	8½	8	9	7½	9
8	8	8	8	8	9	12– 6	8	8½	8½	9	7½	9
8	8	8	8	8	9	12–10	8	8½	8½	9	7½	9
9	9	9	9	8½	9	13– 2	9	9	8½	9	8½	9
9	9	9	9	8½	9	13– 6	9	9	9	9	8½	9
9	9	9	9	8½	9	13–10	9	9	9	9	8½	9
9½	9½	9	9½	9½	10	14– 2	9	9½	9½	10	9	9
9½	9½	9	9½	9½	10	14– 6	9	9½	9½	10	9½	9
9½	9½	9	9½	9½	10	14–10	9	9½	9½	10	9½	9
10	10	10	10	10	10	15– 2	10	10	10	10	10	10
10	10	10		10	10	15– 6	10	10	10	10	10	10

General characteristics of the curves of growth for most intellectual abilities resemble the growth curve for vocabulary. This is characterized by a rapid rise in test scores in the first years with a gradual slackening as age 15 is approached except for a brief acceleration somewhere between ages 10 and 12, a rise sometimes referred to as the pubescent hump. While most of the abilities tested on the WISC conform, with slight variations to this logistic curve, which characterizes a great many other functions studied including those of most physical traits, there are one or two exceptions in our findings. These are most clearly revealed by the age curve for memory span. Here it is not possible to apply the characteristic ogive. Instead, the line connecting the mean scores at successive age levels consists of a series of rises separated at irregular intervals by plateaus of greater and lesser breadth. The plateaus may be due in part to the fact that the units of measurement are too large or insufficiently discrete. But they might also be interpreted as showing that mental capacities are, contrary to current views, discontinued functions, that is, quantities which can increase or decrease only by certain amounts or quanta. If this were generally true the ogive type of curve found for functions like vocabulary might only represent an artifact due to the cumulated effects of learning.

More immediately important, however, from the point of view of maturation, are the differential rates of increase revealed by the curves (see Table I), and more especially the fact that though most abilities increase up to age 15, they do so at progressively decreasing rates. Thus, the mean scores in the Maze Test increase up to age 15, but the increase after age 10 is so small that for all practical purposes it may be said to be negligible. And even this small increase with age will only show up if we take the performance of the theoretically average 15-year-old as the base for comparisons. But average performance is not, of course, defined by a single point but by a range; thus, if we take the actual mean height of the native adult American male at 5 ft. 8½ in. we could still call a man of average stature when his height falls between 5 ft. 7 in. and 5 ft. 10 in. In the same way, though the mean score on the Maze and other tests at age 15 is 10, the lower limit of normality (—1 P.E. from mean) is eight, and if we take this score as the base of comparison we find that children approximate the adult level of performance at even younger ages. This is most clearly seen in the case of functions which are relatively independent of learning, as in the Maze, Picture Completion and Digit Span tests.

What are the implications of these findings? The first, and one that has often been pointed out before, is that different abilities emerge and mature at different times. Education, to be most effective, should be related to the maturation levels of the child. This is, of course, an accepted principle in education. But while posited in theory, it is applied only to a limited extent in practice. And this for two reasons: first, because ages of maturation of different intellectual functions have not been fully established and, second, because of the difficulties in combating long-held mis-

conceptions and cultural biases. Consider, for example, the many work hours or, if you will, play hours, wasted every year in teaching children to play musical instruments before they are ready for them; or again, the even greater number of hours in teaching reading to children in the first year of school, because at some time in the distant past somebody decided that reading was a first-grade subject. But even more egregious are the sins of omission than those of commission. Educators have systematically underestimated the abilities of children and have tended to ascribe poor achievement to lack of learning readiness or even lack of capacity rather than to the inadequacies of teaching methods. This tendency, it is gratifying to report, is gradually being shaken, and in some progressive schools, at least, there is a growing movement to introduce "difficult" subjects earlier in the curriculum. Thus, I was recently surprised to have my son of nine explain to me the atmospheric pressure principle involved in the experiment of forcing an egg through the mouth of a milk bottle which had been demonstrated to him at school that morning. It was not until I was in the seventh grade that I was exposed at all to scientific experiments and not until I was in high school that I heard the term atmospheric pressure. I can testify that the youngster who is not precocious understood the principle, as one may assume did most of the children in the class. This can be expected if our data regarding maturation of intellectual functions are correct, for they show that all intellectual capacities are pretty well "mature" by the age of 12, in the sense that little further development in the substrate abilities occur beyond that age. This does not, of course, mean that basic endowment cannot be influenced by socio-economic and cultural factors. Even I.Q.'s, as we know can be raised, but that is not because the child's native endowment is altered, but because the factors which have inhibited it have been removed. This distinction is important because it points to the fact that the aim of education should not be to create abilities which it cannot, but to utilize them which it does not.

While I have concerned myself only with phases of intellectual maturity, I think it would be useful to emphasize that the same sort of problems confront us in the evaluation of emotional maturity. Unfortunately, we here enter into an area where no general definition seems to exist. It appears that emotional maturity means a type of behavior which the sponsoring author conceives as his adult ideal. Without attempting to review any of these diverse ideals one needs first to call attention to the fact that, except in a very broad sense, we cannot speak of emotional maturity because it involves a variety of emotions. For example, an individual may be mature as regards his fear reactions but remain immature as regards his sexuality. Moreover, there is definitive evidence that the individual develops emotionally and instinctually at different rates in different areas in the same way as he does in the intellectual spheres. Unlike the case of intellectual abilities we do not have precise ways of appraising affective capacities and more especially the substrates as compared to the behavioral as-

pects of emotionality. In general, however, it seems quite certain that emotional maturity at the substrate level, occurs much earlier than is generally supposed. For example, the anger and fear reactions, as Watson has shown, occur as early as the first few weeks of infancy, and while their pattern is not identical to what we get in adulthood, the essential form of the reaction is already present. Similarly, we could run down any list of emotions and show that their basic manifestation appears long before adolescence. It is interesting to note also, as in the case of intellectual abilities, some appear earlier than others. Thus while the child, even as an infant, shows capacity for love, it is not until he is five or six years of age that he manifests hate in the ordinary sense of the term.

It is unfortunate that in order to meet their economic and cultural pattern various societies have prolonged the child's period of infancy. They have done this by being blind to the individual's relatively early emotional as well as intellectual development, and by setting up artificial criteria of maturity which prevent the young person from entering into adult activities of the group. It would take us too far afield to point out the many deleterious effects of this process. One of them, however, is worth mentioning because it is not so obvious. It is this, that prolongation of the infancy period serves in a certain sense to nullify our advances in longevity. While we have been adding to the span of adult life by extending it at one end, we have at the same time been curtailing it at the other by delaying by years his participation in it.

THE IMPORTANCE OF "TIMING" IN CHILD HEALTH SUPERVISION [1]

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Pediatricians have for a long time been talking about the premature infant. By their very use of the word, "premature," they have accepted the definite implication that some degree of "maturity" exists for most individuals even at the time of birth. The question is not an academic one. There are practical implications in the consideration of the maturation process as one which extends from the beginnings of the individual throughout his developmental years.

In this paper an attempt will be made to show how the pediatrician does a more effective job when he applies certain concepts of maturation to his work of supervising the health care of children. The application may take place in such varied phases of his work as doing a physical examination of a child or taking a medical history from the parent, giving medical or surgical treatment to children of different ages, advising parents concerning child rearing, planning medical and related aspects of care, and in respect to the participation which the child himself is given opportunity to take in determining his health habits. Within each of these aspects of pediatric work only illustrations can be presented here without attempt to exhaust the possibilities of application of concepts of maturation to each. Chief emphasis will be placed on the physical and physiological aspects of the maturation process and to a lesser extent on the other phases of child health supervsion.

The subject can be organized around seven concepts of the maturation process. Although the concepts themselves are well known and have been well emphasized, there is value in relating them to the common everyday problems which arise in the supervision of the health of children.

The first concept is as obvious as it is basic and fundamental—that the maturation of the human species follows a definite time pattern. All schools of child care are predicated on the fundamental fact that there is a pattern to which all individuals conform or which they approach and from which the few may deviate.

For convenience or for other reasons, we, too, often disregard the natural timing. For instance, the smaller newborn infant has a smaller stomach capacity and a shorter emptying time of his stomach. Therefore, the intervals between his needs for refeeding are shorter. The larger baby has a larger stomach capacity and can go a longer interval before he becomes

[1] Delivered at the Symposium on the Concept of Maturity from the Anatomical, Physiological, and Psychological Points of View at the meetings of the Society for Research in Child Development, New York, December 28, 1949.

hungry. It is common observation that seldom can an infant much under seven pounds in weight go longer than three hours between feeding. Yet, it is almost standard practice in hospital nurseries throughout the country to attempt to place all newborn infants, except the prematures, on a four-hour routine. The traditional bedlam of crying which meets one entering the hospital nursery is the result, among other causes, of this attempt to regiment small infants with the larger ones. We seem to have forgotten that the species pattern of mauration changes a three-hour feeding interval to a four-hour feeding interval at a rather definite point in the increase in weight of all babies.

This situation has no relation whatsoever to the question of whether one feeds an infant on a regular schedule or on a so-called "self-demand" schedule. The fact remains that smaller babies, if permitted to establish their own schedule, will choose approximately a three-hour routine while larger babies will accept for themselves a four-hour interval.

Facts concerning the pattern of human maturation have been learned to a large degree through cross-section studies of groups of children. Of course there are still many gaps in our knowledge of the pattern. A few illustrations may suffice to show how filling the gaps would help the pediatrician in his child care supervision. At what age does an infant realize, when he meets the eyes of an adult, that he is being looked at? Some years ago in my pediatric practice, I noticed that the young baby may catch your eyes, look at you and apparently respond to your facial expressions. But it was my impression that he saw my eyes merely as objects of interest, perhaps just as my nose, my chin or my ear. At a rather specific age, between five and six or seven months, exchange of glances between the infant and a stranger, such as the doctor, suddenly seems to have for the child the new significance that *he* is being looked at, and he may become fearful and cry. Consequently, it became my established routine when a child reached this sensitive age for me to examine him without looking into his eyes. I had very little difficulty with the stethescope or with feeling him or moving his arms and legs as long as I did not catch his eyes. The instant I would catch his eyes, the child would begin to cry. A very few months later, perhaps at about ten or twelve months, the child seems to recognize that eyes are looking at him, whether or not glances meet, and he displays appropriate interest or fear in accordance with his feelings at the time.

Although the significance of this observation may not be apparent, it is illustrative of some of the minute elements of the maturation process which could be applied by the pediatrician as simple though valuable aids in attaining a smooth, harmonious relationship between doctor, mother and infant during the medical examination. Similar successive changes take place, as we know, in the infant's attitude toward restraint, toward his being made to lie down and toward his memory of pain. At what age does he really remember from one visit to the next, the pain of immunization? Information on factors such as these could help pediatricians organize the

procedures of their offices or clinics so as to exploit the timing of the maturation pattern.

Feeding an infant today is a rather complex process; formulas, early addition of cereals, fruits, vegetables, eggs and meat. How much actual fact lies behind the feeding practices of our day? We need to have more information on the maturation of the digestive system of the growing infant. We need to know more about the absorption capacity of the digestive tract at different ages. What foods are absorbed unchanged? How large a molecule can pass through the lining of the intestine of the infant as compared to that of the older child or the adult? What are the possible relationships with allergic manifestations? What is the status of enzyme production at various age levels?

If we knew the answers to these and other questions, we could say with greater confidence that we had a rational approach to the feeding of infants. At the present time, however, the advice that is being given to mothers concerning infant feeding is largely pragmatic, and pragmatism here means, "does the baby get away with it?" The human constitution, even in infancy, is hardy. Although no gross harm seems to have been done, we have no way of telling whether the lengths to which we go are worth while, or whether the infant would do at least as well with a much less complex diet and a slower rate of addition of new foods during the first year.

It is essential that we learn as much as we can about the timing of the human pattern of maturation and that we learn how the pattern is modified, if at all, by race or sex or other factors.

The second concept of the maturation process is as obvious as the first and perhaps as fundamental. Within the species pattern individual variations occur. This is the concept, of course, which permits that flexible approach to the individual which we all seek. It is on this basis that the small infant on a three-hour feeding schedule is permitted to lengthen his feeding interval to the four-hour schedule when *he* is ready to take that step. He is permitted to drop his night feeding when *he* is ready to do so.

In our efforts to individualize our approach and to meet the specific needs of each child, we work within the concept of the *species* pattern rather than in disregard of it. While we recognize that there are variations among individuals, we also recognize that the variations usually fall within a predictable time range. Otherwise, we would extend individualism to chaos and we would lose the differentiation between the normal range and the abnormal extremes.

We permit the infant himself to determine the time for changes in feeding interval because we know no better index than the manifestations which he displays of his desires. At the same time, however, we do know that his stomach emptying time and capacity provide the basis for his developing a feeding interval of a rather consistent length, and we do know the extremes which one would expect in the feeding interval. We

would not feel happy if the infant developed a one-hour interval or a regular six-hour interval between daytime feedings. In the one-hour interval, we would believe that needs of the infant, other than nutrition or hunger, were being met by the feeding process, and in the six-hour interval we would suspect illness of some kind.

Each item of the maturation of the body form or function has its own range of normal individual variation in time. The first tooth usually appears at about six months, but may appear as early as three months or as late as ten or eleven. In the male newborn infant the testes are usually descended into the scrotum at the time of birth, but may not descend until puberty. The normal time range for eruption of teeth then is about eight months whereas for descent of the testes there are years between the earliest normal and the latest normal.

The normal time range of each aspect of maturation usually forms a symmetrical distribution curve balanced about the median point. The time of descent of the testes is an illustration of an asymmetrical curve since most boy babies are born with the testes fully descended and only a small number first show descent each additional year until puberty.

Such asymmetrical distribution in timing gives us caution in generalizing on what are the extremes of normal. It is not merely a quantitative lopping off of the ends of the curve beyond two sigmas on both sides of the median. For our better understanding of the place of the normal in the range of individual variation in the time of maturation, we need more longitudinal studies of individuals as a basis for helping us to accept the wide differences among the normal and at the same time to recognize and treat the abnormal.

The third concept relates to the pace and character of the progression of maturation. There are three possible patterns to the progression of maturation. It can be an even consistent progression, or a generally progressive trend with intermittent pauses, or there can even be true periods of retrogression.

It is difficult to call to mind a single item in the physical, physiological, psychological or intellectual maturation of the individual whose progress is even and steady. If any suggest themselves, it is likely that finer methods of measurement than we now know would show unevenness in the progressive trend.

The most common pattern of progress seems to be the one in which the general forward trend is interrupted by intermittent pauses, a sort of stepladder progression with rises and plateaus. The increase in body weight and height are perhaps the best known illustrations of this type of maturation.

True retrogression as a normal feature of maturation is probably less common than parents have generally come to believe. The mother who states that her child seems to be taking two steps forward and one step backward displays an accepting and probably wholesome attitude toward

her child's development. More careful analysis may often reveal that the so-called step back is closer to a halt rather than a step backward and may even be a step forward.

Take the situation of the baby who used to sleep well at night and then at three or four months of age starts to cry through the night. To the parent that is a step backward. You will usually find, however, that the crying is the result of the parents' effort to change the child's night feeding interval without sufficient regard to the infant's readiness for the longer interval. Furthermore, the method of change which is so often attempted does not give consideration to the quantitatively progressive and gradual type of maturation in the infant's ability to sleep longer periods without feeding at night. The twelve hours between six p.m. and six a.m. the next morning had previously been divided into three four-hour intervals, six to ten, ten to two, and two to six. Because the parents wanted to drop the two a.m. feeding they tried to divide the twelve hours into two intervals, one of four hours from 6 to 10, and one of eight hours from 10 to 6 the next morning. Usually the child is actually ready for a change. But he is ready to divide the twelve hours into two equal periods of about six hours each and so, if left alone he would sleep through the 10 p.m. feeding, waken about midnight for a feeding and then sleep until six the next morning. Whereas, if the parents try to drop the night feeding by waking him at 10 p.m., they are usually unsuccessful; he is too tired, is not ready, feeds very little and cries through the night. The child knows how to change the twelve hours from three equal four-hour periods to two reasonable and equal six-hour periods better than the mathematics of the parents, or the immediate convenience of the household would dictate.

One possible example of retrogression in the maturation process is the quantity of food taken by the growing child. The intake is very often less the second year than in the first year of life and less in adulthood than for the teen-age boy. Of course, pediatricians know that the body which is being built is not getting smaller during the periods of lesser food intake; it is merely growing at a slower rate, and both the physiologic need and the physiologic capacity for food seem to be less during periods of slower growth. This simple fact of itself is important for parents, too, to know. If more mothers knew that in the second year of life their baby is expected to take less food than he had been gobbling during that voracious first year they would be ready for the lesser intake. Fewer of them would react as they do with fear that something is wrong when that large bowl of cereal is no longer being consumed, even though the child is older and larger than before.

Again, we need more longitudinal studies, like the many valuable ones which have been and are being made, to give us information on the pace and consistency of maturation and the relationship between the periods of rise and those of plateau for each item of maturation. One illustration of the value of such knowledge is in respect to bone growth. Very often a

child may have a condition in one leg resulting in slower growth of that leg. If the difference in the rate of growth of the legs is permitted to continue throughout the growing years, a four- or five-inch difference in length of the lower extremities could result. A mildly disabled child now becomes a grossly disabled adult. New methods of control of bone growth by epiphyseal arrest or retardation or possibly acceleration of rate of growth by arteriovenous anastomosis, are now being developed. They could be applied to children most effectively only if we have accurate information on the expectation of maximum growth in any individual, the component of that growth which will be contributed by each end of each bone in the lower extremities, and the timing of the periods of rapid and of slower growth. The two objectives of approximately equal length of the lower extremities and of maximum height of the individual can be attained only by the treatments being timed strategically relative to the growth process.

The fourth concept concerns the relationship between any stage of maturation and the previous stage. The difference between the two may be one of addition, of subtraction, or of replacement, or may be a qualitative change. Illustrations of subtraction are the decrease in area and activity of blood formation in the bone marrow or of the activity and size of the thymus gland in the school-age child as compared with the infant and younger child. An example of the qualitative change is the alteration in shape of the larynx and the consequent change in voice of the boy going through puberty.

The addition type of maturation is the simplest one and perhaps we can say an early accomplishment of nature. Cells grew larger before they became differentiated. It is not surprising that the type of maturation which consists of replacement or substitution and which is one of nature's more sophisticated accomplishments, should be more delicately balanced and more vulnerable to disturbance. In the change of the body circulation from the fetal to the postnatal type, congenital anomalies often develop. Transfer of activity or function constitutes a fertile field for study in respect to the causation of an abnormality.

It is especially important that we learn the significance of the exact time of change. Endocrine disturbances, for instance, seem more likely to occur at critical periods when the endocrine function of the body is undergoing a change from its previous type of balance. Perhaps the excessive production of white blood cells in leukemia starts during the periods when the status and function of lymphatic tissue are undergoing rather rapid change in one direction or another. The faculty of fusion of vision, or using the two eyes in synchronized coordinate fashion, develops at a rather specific age. It has often been suggested that the factors resulting in strabismus or squint relate to the time of the development of the faculty of fusion.

Concentrated studies on the periods when replacement or substitution are most conspicuous in the maturation process may be helpful in diag-

nosis and in prevention of disability or distortion of function. We shall also come closest to attaining appropriate techniques of handling children at each level in their maturation if we keep in mind that even when substitution or replacement does occur the new process or new type of function rarely if ever completely disregards the old method. It builds on the old even in the process of replacement.

The fifth concept of maturation is as obvious as the others. Different parts or functions of the body mature at different rates. We know that, except for a possible general acceleration in maturation which may occur during the spurt periods of fetal and pubertal growth, little parallelism exists in the rate of maturation of such items as the body mass, the reproductive system and the nervous system.

Therefore, the maturing body is a constantly changing constellation of parts and functions. As we so well know, the rapid growth during adolescence causes the disparity in maturation of the different systems of the body to become more conspicuous and produces the traditional adolescent, part child and part adult. That the same discrepancy in maturation exists, though less obviously, through all stages of the development of the child is shown by the mother who says "She knows enough to tell me before she does it. Why doesn't she warn me in time?" It is the role of the pediatrician to advise mothers that the child's learning a word for urination does not necessarily mean that she has gained bladder control, just as the appearance of first teeth in the baby does not indicate a readiness on the baby's part to renounce breast feeding as quickly as the mother might hope under the circumstances.

With more careful analysis of the details of the maturation process we shall learn how to generalize recognition of a stage of maturation of one part or function of the body to other aspects.

The sixth concept of maturation follows closely upon the fifth. Although different parts or functions of the body mature at different rates, the stage of maturation of any one system affects the other systems and all in turn affect the individual. We can theorize, for instance, that even if the body musculoskeletal system and the cardiovascular system were not under a common growth influence, the increased growth of the body on the one hand would place a greater load on the heart and would therefore stimulate the latter to develop to meet the need. And conversely, if increased heart output and efficiency occurred independently of increase in the body mass, such increased efficiency of the heart would lead to more rapid body growth. The development of one system results in demands being made upon the others. Just as functions of the body waste with disuse, whether it be vision or muscle strength, so they are probably stimulated to prosper by use.

The lesson to be learned from the pediatrician is that an indirect approach through another system may at times be the more successful method of improving a retarded function. In the treatment of the child with cere-

bral palsy, opening new channels and media for the child's mind by correction of a previously unrecognized deafness or by speech instruction, aid in the child's gaining muscle control and body coordination. The converse also is true, that improvement in his use of the body seems to enhance and facilitate the intellectual functions and activities.

Obviously, one's personality is, in part, the product of what one perceives and of what one does, or at least of what one feels one can do. Becoming oriented to one's self and to one's own capacities is a constant process which is required in the wake of changes incidental to maturation. When this maturation process is gradual and almost imperceptible, one knows rather well where one stands. When, however, the change is rapid, it becomes confusing constantly to be obliged to reorient one's self to one's self. The rapidly growing adolescent keeps looking at himself somewhat as if from the outside, each moment seeing new things about himself, not yet familiar to himself. It must be annoying to the young fellow not even to be sure how big a stride he usually takes while dancing or to the young adolescent girl who helps Mother in the kitchen not to know how far her arm reaches when she stretches it toward the dishrack. We know this uncertainty is one of the factors in the adolescent's tendency to dwell on his bodily defects.

Again, disorientation to body status is more obvious during adolescence because of the more rapid change which is occurring. At all stages of maturation, however, there must exist some lag, though often slight, between the development of a part or function of the body and the child's recognition and acceptance of the new capacity. Concomitantly, it is not surprising that the child by repeated experience learns that his efforts which failed yesterday are today's successful accomplishments. The child's natural drive to explore and to experiment may thus at times be accentuated by his sensing the possibility of new attainment having been reached since his last unsuccessful attempt and he may try things which his judgment otherwise tells him not to. Parents should be encouraged to allow for and give due credit to errors of exploration, perhaps somewhat more so than to errors of default.

The seventh and last concept to be presented here concerns the interaction between the maturation process and the culture in which the individual matures. We must turn to anthropologists and other research workers with the question of whether and to what degree, if any, cultural handling of children affects the maturation process. Although we know that much of the maturation process is apparently immune to cultural influence, it is important in our analysis of the range of variation among different individuals and even in our study of the basic pattern of the species that we attempt to differentiate changes which are inherent from those which are culturally caused. For instance, we know, that newborn infants lose weight during the first few days of life. For a good many years, pediatricians gave much effort to attempts to obviate the initial

weight loss of the newborn despite general realization that the newborn infant seems to require no food, not even water, during the first day or two of life. It is a fact that the mother's breast does not produce milk immediately after the birth of the infant. Infants seem to have been destined to go through an initial period of starvation. Perhaps the physiology of the newborn infant has developed accordingly, and perhaps our efforts to overcome the initial weight loss are not an improvement upon nature but rather a distortion of the physiology of the infant as it exists during those first few days.

Another illustration of the same thesis is the fact that the newborn infant's blood has a very high hemoglobin content and red blood cell content which rapidly fall so that by the third or fourth month of life, the infant has a much lower hemoglobin and red blood cell content in his blood than older children or than adults. Calibrated by the standards of older children and adults, this has often been considered a state of anemia. For years pediatricians tried with limited success to overcome this "anemia" by one or another type of treatment or diet. It is still difficult for us to say whether the relative anemia during the middle months of the first year of life may be considered normal and unnecessary to treat or whether it is a cultural development. Perhaps mothers in our society are unable to give infants the kind of blood which maintains its level consistently through the first year of life.

While there remain for study such questions concerning the effects of culture upon maturation, we can say without hesitation that our culture repeatedly disregards the fundamental concepts of the maturation process. We make demands on our adolescents as the time or occasion seems to warrant rather than in the light of a basic pattern of maturation. At times of unemployment, the youngsters are urged to continue their schooling and are coddled as children in order to postpone their competing with adult workers. In times of labor scarcity or military pressure, they are treated as grown men and women who should take full responsibility side by side with their elders.

Our culture disregards in so many ways the individual variations in maturation. Our children, whether in school or social activities, are grouped largely by chronological age rather than by their age of maturation. Frequently, their own selection of groups approximates more closely than ours their maturation similarities.

Our system of justice too often disregards the disparities of maturation of the different components of an individual's physique, physiology or personality. Just as the farmer decides when potatoes are ripe to be picked, "when they are big enough they are old enough," so our youngsters' behavior may be frequently judged by chronological years. No doubt, a judge's decision is often considerably affected by the size of the juvenile offender.

It may be appropriate to quote a story told by a mother. She said that she took her four-year-old for a long ride in the family car and had the

child sitting with her on the back seat. Despite a pleasant drive on a lovely day through interesting countryside, the child became fretful and difficult. She wondered why. Then it occurred to her to slump down in the seat until her eyes were at the same level as the child's. And all she saw through the car windows was a patch of sky and rapidly passing tree tops. She said that she realized at that time that in order to understand her child and to act appropriately, she would have to try henceforth to place herself at the child's level.

This mother's story tells in a few words simply, but effectively, some of the things that have been said here about the concepts of maturation. We must try to gain more knowledge about the maturation process. Our advice to parents concerning child health should more and more be based on facts rather than on theory. Our acts, as physicians and workers with children and parents should be *attuned* to the phenomena of maturation. It is not so much *what* we do as *when* we do it.

PRESIDENTIAL ADDRESS

Society for Research in Child Development
New York, December 29, 1949

ALFRED H. WASHBURN
Denver

The first Biennial Meeting of this Society was held 15 years ago at the National Research Council in Washington. Isaiah Bowman welcomed the members of the Society on behalf of the National Research Council of which he was the Chairman. In responding to this welcome Dr. Robert S. Woodworth outlined the purposes of the Society for Research in Child Development. As the first Chairman of our Society, Dr. Woodworth opened his talk by saying that "the National Research Council is more than our host of the day. She is the fostering mother of the infant which is here taking its first steps; but, as a well-adjusted modern mother, she is not disposed to keep her child dependent but is ready and willing to see that infant walk alone." There is every indication that the distinguished scientists and scholars, who participated in this first meeting in November, 1934, considered it an historic occasion.

This meeting in New York, December 1949, is also an historic occasion. It is the first meeting of this group as a completely autonomous Society—now, after 15 years, our Foster Mother has sent us out into the world to fend for ourselves. The debt which this Society owes to her Foster Mother, the National Research Council, is tremendous even if, like many another adolescent, she does not always exhibit her awareness of it. It seems fitting, as we take part in starting this Society on a long and useful independent career, that the retiring President should pay tribute to the wisdom, the foresight, and the very tangible assistance bestowed upon our Society during its childhood from the National Research Council through the Committee on Child Development in its Division of Anthropology and Psychology.

In reading through the complete account of the first meeting I found so many quotable passages, from so many distinguished speakers, that I was tempted to make up my entire address from the words of those who, in 1934, seemed wiser than I am today. Feeling the responsibility of attempting to give you some of my own thoughts, I have limited myself to four brief quotations. The first two are taken from Dr. Woodworth's opening address.

"The words, 'child development,' in our Society name, are intended to cover the entire developmental period from conception to maturity. No one has yet suggested stretching them to cover the stage of involution and

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senescence, though in the nature of things biological there would be good reason for keeping our eyes open to that phase of the life cycle." May I suggest, in 1949, that I am even more impressed with the need for keeping our eyes open to the importance of visualizing the entire span of the growth, development, and adaptation of the human organism. Dr. Woodworth gave us some elaboration of his concept in a subsequent paragraph.

"The importance of child development as a field of research cannot be called in question. The physical vigor and mental health of the adult depend on the growth process of childhood and youth, as well as on the genetic constitution which also in all logic comes within the scope of our Society. The social characteristics of the adult population have to be formed in early life. But to think of the child as existing simply for the purpose of becoming an adult would be false teleology from the biological standpoint and bad social evaluation as well. The growing child and the maturing youth are not mere means to an end but are entitled to full recognition in their own right. At any rate the student of child development has his eye fixed on the developmental process itself as something supremely fascinating and worthy of investigation."

Later in the same program Dr. Lawrence K. Frank directed the attention of the Society to the "problem of child development as distinguished from current child research work that studies professional problems using children as subjects." "Child development," he said, "is concerned with the growth and development of the individual child over a period of years, as revealed by data collected with techniques from all the relevant life sciences to reveal the changing structures, functions, and activities of the individual child."

Although now, 15 years later, I find myself still in agreement with much of what was said by Dr. Woodworth, Dr. Frank and a score of other speakers at that first meeting in 1934 yet I am bothered by the optimism which was expressed repeatedly through these sessions. This included optimism about the immediate future of the Society; optimism in regard to general acceptance of the idea that "there is a field of research which we may call child development"; and optimism concerning the probable success of the Society in stimulating an increase in the number of child development institutes and in the further growth of the then existing institutes as "centers for developing this field of research." In this connection I was interested to note that Dr. Frank Freeman remarked that "one question agitates our minds somewhat ... namely, whether there is such a field as Child Development or whether child development is simply the meeting point of different specialists."

The history of the Society to date, as I interpret it, would seem to indicate that the latter is the case. We have represented a meeting point of minds from different disciplines rather than a primary field of scientific research. The majority of members have, year by year, owed their first allegiance to a Psychological, a Pediatric, a Psychiatric, an Educational, or

an Anthropological Society. While this may represent a very real handicap in terms of financing, in terms of attracting loyal workers for the Society, or in terms of support of the Society's publications, it is by no means an unmitigated evil. In fact I believe that this situation points to a larger and more important function which is urgently in need of fulfillment. The need for a multidisciplinary approach to the many complex problems involved in an understanding of human growth makes it imperative that there be a meeting point for the many different specialists engaged in studying each aspect of the total problem. If this Society can serve more broadly and more efficiently as such a common meeting ground it may occupy a rather unique as well as extremely useful position among scientific societies. The course of wisdom would seem to me to consist in facing realistically our position and bending every effort to make the Society for Research in Child Development so happy and so fruitful a common meeting point that it may serve to foster constant cross-fertilizing between many different disciplines bearing on human growth.

I have just used the term "human growth." Since I wish to avoid any controversy over definitions let me just say that I am using the term "growth" to include all the phenomena—all organismal activities and all mechanisms within and without the organism—involved in the progress of the organism from conception into the mature years. I should like to see included in the Society's membership those interested in every aspect of human growth. With this in mind it seemed to me that it might be worth while to attempt some elaboration of the concept of growth from the physiological standpoint.

The word "Growth" seems familiar enough not only in scientific circles but in ordinary lay conversation. It has been used, surely, since the earliest beginnings of the study of Biology. But as Sir Charles Sherrington has remarked in his delightful book, "Man on His Nature," the concept "took long in getting to grips with its intimate scientific 'how'." Thus in a conference at Princeton in 1946 on the "Chemistry and Physiology of Growth" Paul Weiss complained that "Growth is a word, a term, a notion covering a variety of diverse and complex phenomena. It is not even a scientific term with defined and constant meaning." He then goes on to show that it has been used to connote "reproduction, increase in dimensions, linear increase, weight gain, increase in organ mass, cell multiplication, the process of mitosis, protein synthesis," and many other things as well! Weiss' own description of Growth is, "the capacity of the reproductive system to procreate more systems with similar reproductive faculty."

The confusion of meanings for this simple word is dependent first, upon the fact of its earlier use both in biology and in common parlance before it "came to grips with its intimate scientific 'how' "; and second, upon the variety of approaches being made, with increasing momentum in the last decade or two, upon many aspects of Growth. Thus papers appear in almost bewildering confusion from geneticists, embryologists, biophysicists,

zoologists, pediatricians, psychologists, sociologists, chemists, virologists, mathematicians and many others. To me the most fascinating part of this concentration on the phenomena of Growth by scientists from so many disciplines, in the last few years, is the way in which views begin to converge, results of varied investigations begin to complement each other, and concepts derived from so many different avenues of approach begin to become unified.

Growth does cover a multitude of phenomena but there is a unity which binds them all together. As we observe it in a growing child it does include increases in height, in weight, in size of organs; it also includes increasing functional facilities and powers of adaptation to varied environmental influences. Moreover, it includes the maturation of some functions which are present at birth only as potentialities. But what basic activities underlie all these varied phenomena? Our current knowledge of these processes we owe to the extraordinary advances of recent years in physics and chemistry applied to living systems.

Of all the organized living systems which we know Man is probably the most complex. But the size and form—the architecture of any multiple cell organism, including Man—is the architecture of each of its millions of microscopic cells in aggregate. True growth is accomplished only by what goes on in these tiny cells, including the multiplication or reproduction of new cells, the reproduction within cells of that part of the molecular structure capable of further reproduction in its own image, and the differentiation of cells for specific functions. And if one may speak of the cell itself as having spacial and functional architecture, then one may say that the essential building stones for that architecture are the proteins. The very secret of life itself seems wrapped up in these protein molecules. The search for more knowledge of genes, of hormones, of vitamins, of enzymes, of viruses, and even of cancer, centers now on investigations into the nature and behavior of various protein molecules. No wonder, then, that the basic processes of growth are under such intensive research in so many fields of science!

Where does this leave us in our Study of Human Growth? Does it alter our purpose—our ultimate goal? It seems to me, on the contrary, that it strengthens our purpose. It makes our goal more fascinating and more meaningful. It means that we must work now with constant awareness of and in close cooperation with the biologist, the chemist, the biophysicist and the others who are investigating the metabolism of the cell, the potentialities of the protein molecules for good or ill. Then we should have a much greater chance, ultimately, of understanding the meaning for a given individual's future behavior of his own characteristic growth pattern, observed during infancy and early childhood.

May I quote again from the Princeton Conference of 1946: "We realize now that any factor that has an effect on the physio-chemical setting in which growth occurs may thereby alter the manifest form which the

growth process will take. But it is evident that such actions will be in the nature of merely modifying already established patterns rather than instituting wholly new ones" (Weiss). One might say that our purpose is to get at the established patterns in each baby and child whom we are following; and to study at the same time the setting in which his or her growth is occurring from the prenatal period on up through adolescence, into adult life. There is convincing evidence that each individual's pattern has meaning concerning what sort of an adult he is apt to become. There is, of course, equally convincing evidence that environmental influences—the setting in which growth is occurring—may alter the pattern to a greater or less extent in different persons.

You may feel that I have overstressed the physico-chemical contributions to our knowledge of growth phenomena. I am not unaware of the advances of recent years in the fields of psychology, anthropology, sociology, pediatrics, and psychiatry. I am, however, deeply impressed with the strides made in the field of genetics through the happy union of physics and biology. Is it not possible that we would profit immensely by the inclusion, at our common meeting grounds, of some of those investigators concerned with the study of fundamental growth processes at the cellular level? Is it not time to ask ourselves whether it is really possible to consider research in child development apart from the whole broad problem of understanding the growth and adaptation of the biological organism which we call Man.

Earlier in this paper I quoted Woodworth as saying that "to think of the child as existing simply for the purpose of becoming an adult would be false teleology from the biological standpoint and bad social evaluation as well." It is equally true that the growth or developmental patterns of any given individual child are meaningful largely in terms of the whole life cycle, from the gametes carrying the genetic potentialities through to the latter part of the life span. Patterns observed in infancy and early childhood carry meaning for the later years as well as evidence of their derivation from the continuous interaction between genetic and earlier environmental influences. What is most important in studying a child growing and developing is not his status at a given moment but what he is becoming—what Sir Charles Sherrington refers to as "the doing of the organism." Growth is a dynamic process—the growing organism is continuously changing. It is the direction and the pattern of changes in structure and functioning at all levels which we, as a group, find so fascinating a study.

The retiring president of the Society is, of course, in a very enviable position. He is able to give his advice to the Society without stint, knowing full-well that he will not have to assume any responsibility for translating it into action. In this brief address I have tried to avoid any unrealistic, glib or irresponsible advice. I have urged the consideration of two possible developments for the Society. The first is that the Society for Research in Child Development be made a happy and fruitful meeting ground for those

from every discipline concerned with child growth and development. The second is that every effort be made to bring into these meetings of minds investigators from the physico-chemical fields—men and women who have found a challenge in the application of their knowledge to the fundamental problems of biology. There is much cross-fertilizing of ideas needed between those whose concepts of growth are derived from the study of protein molecules or cell reproduction and those of us whose concepts are derived from the study of the growth of so complex and indivisible a biologic unit as an individual child.

It is difficult to think of anything the world needs, or will need more in the next 100 years than a better understanding of why people behave as they do; and of how we may safeguard the setting in which growth takes place in such a way as to produce a happier and a healthier world population, capable of living together in peace. The cynic may say that this is an idle pipe dream. The scientist must reply that we shall not know until we have tried, and tried again, with the means now at our disposal as a result of scientific advances of the last few decades. It seems no more an impossibility than would have seemed our present knowledge of the protein molecule and the part it plays in Life and Growth, a century ago. Today a more adequate understanding of human growth and adaptation requires the working together of investigators from many different disciplines. I can think of no more exciting challenge for this Society than the problem of how best to make it serve as a fruitful meeting ground for the many different research workers now engaged in studying some aspect of human growth.

SOCIETY FOR RESEARCH IN CHILD DEVELOPMENT

Minutes of Business Meeting
December 29, 1949

Following the Presidential Address, the meeting was called to order. Dr. Alfred R. Washburn, President, presided. Thirty-five members of the Society were present.

Dr. Washburn opened the meeting by giving a summary report of the happenings of the last year, enumerating the actions of the Governing Council during the year, as follows:

1. Appointment of Dr. T. W. Richards as Editor-in-Chief and Business Manager, and of Miss Alene M. Gustavson as Editorial Assistant.
2. Appointment of Dr. Robert J. Havighurst as Secretary and of Miss Ruth I. Cooper, as Associate Secretary.
3. A committee was set up to revise the constitution. This committee consisted of J. Carson McGuire, Ruth Updegraff, and Celia Burns Stendler, Chairman.
4. Resignation and death of the President-elect, Dr. C. A. Aldrich.
5. Appointment of Program Committee, headed by Charlotte del Solar.
6. Appointment of Nominating Committee, whose duty it was to prepare a slate for the election of officers at the Business Meeting. The Chairman of this Committee was Wayne Dennis.

Since there was no business meeting at the last biennial meeting of the Society held in Chicago, in December, 1947, Dr. Washburn asked permission to waive the reading of the minutes, since there were no minutes.

The Business Manager, Dr. T. W. Richards, next reported on the financial condition of the Society, and mentioned that many members were several years in arrears in payment of their dues. The motion was made, seconded, and carried that the Business Manager get such information as would be needed and take whatever action seems to be ethical regarding back dues. The motion was made and seconded that the Business Manager's report be accepted as read. The motion was carried.

The President asked Dr. Frank to address a few remarks to the Meeting. Dr. Frank asked that a resolution be formulated and put on record citing Dr. Woodworth's efforts and services and those of the National Research Council Committee on Child Development in giving the Society its start and its help through the years. The motion was made, seconded and carried that Dr. Frank draft such a resolution.

The revised constitution was then read. The section on elections was discussed and the motion made, seconded and passed, that a mail vote be provided for. It was moved that the President be Chairman of the Election Committee. This motion was defeated. It was moved, seconded, and passed, that the new constitution be accepted as revised.

Dr. Wayne Dennis, Chairman of the Nominating Committee, presented nominations for new officers as follows:

Willard C. Olson	President
Charlotte del Solar	Secretary
T. W. Richards	Business Manager
R. R. Sears	Governing Council — one year term
W. M. Krogman	Governing Council — one year term
Dr. Milton Senn	Governing Council — two year term
L. J. Stone	Governing Council — two year term
R. J. Havighurst	Governing Council — three year term
Dr. Katherine Bain	Governing Council — three year term

It was moved, seconded, and carried that the Secretary cast a unanimous ballot for the officers as listed.

It was moved, seconded and passed that the Society be incorporated as recommended by the Governing Council according to procedures to be worked out by the Business Manager.

It was moved, seconded and passed that Dr. Richards submit proposals for reorganizing the Editorial Board to the Governing Council.

It was moved, seconded and passed that the meeting go on record as favoring the following resolution:

WHEREAS, a need exists for a center of information for current research concerning children; and

WHEREAS, a Clearinghouse for Research in Child Life is being established in the Children's Bureau, at the request of research workers, to further the exchange of information about studies in progress relating to the physical, mental, social and emotional problems of children,

BE IT THEREFORE RESOLVED that the Society for Research in Child Development direct the attention of its members to this Clearinghouse and recommend participation, with the supplying of information about their studies in progress to the Clearinghouse.

Dr. Marian Crane presented a report on the meeting of organizations of the Mid-Century White House Children's Conference.

Dr. Sears presented the following resolution:

BE IT RESOLVED that the Society for Research in Child Development strongly affirms the desirability of Federal support of research on child life and development, and urges the immediate passage of S 904 (HR 4465) to provide the Children's Bureau with funds and authority for this purpose.

It was moved, seconded and passed that this resolution be adopted.

It was moved, seconded and passed that the meeting be adjourned, at 11:30 a.m.

Respectfully submitted,

Robert J. Havighurst
Secretary

Statement of Financial Condition
November 30, 1949

ASSETS

CURRENT ASSETS

Cash in Bank	$ 8,232.69
Petty Cash	19.32
Total Cash	8,252.01

Receivables

	Outstanding		
	Over One Year	*One Year*	*Reserve*
Fellows Dues	$ 339.46	$ 242.00	$ 363.46
Members Dues	154.28	174.00	171.28
	493.74	416.00	534.74

Amount deemed collectible	375.00

Receivables from subscriptions, authors' contributions to publication costs, etc. have not been accrued as their collection is conjectural.

FIXED ASSETS

The Society owns an IBM Electric Typewriter, and sundry office equipment of small value, which is not carried on the books.

$ 8,627.01

FINANCIAL STATEMENT

LIABILITIES, DEFERRED REVENUES AND SOCIETY EQUITY

CURRENT LIABILITIES			
Accounts Payable			$ 62.93
Withholding Taxes			50.80
Total Current Liabilities			113.73
DEFERRED REVENUES			
Subscriptions Collected Applicable to Future Issues			
Child Development Magazine		$ 3,291.00	
Child Development Abstracts		917.00	
Child Development Monographs		938.00	
		5,146.00	
Dues Applicable to Periods After November 30, 1949			
Fellows	$ 156.50		
Members	87.25	243.75	5,389.75
EQUITY OF THE SOCIETY			3,123.53
			$ 8,627.01

SOCIETY FOR RESEARCH IN CHILD DEVELOPMENT

CONSTITUTION

ARTICLE I
Purposes

The purposes of the Society for Research in Child Development shall be (1) to further research in child development by means of meetings, conferences, publications and the distribution of research information, (2) to provide a meeting ground where research workers, teachers, and those in related fields can come together for an interdisciplinary consideration of theoretical problems in the area of child development, by means of meetings and conferences, (3) to encourage the study of the implications of research findings for instructors in child development through meetings, conferences and publications, (4) to assume national responsibility for the coordination of organizations and agencies concerned with the development and behavior of children and young people.

ARTICLE II
Membership

1. The Society shall consist of Fellows, Members, and Student Members. All shall be entitled to the rights and privileges of the Society except as hereinafter provided in this and other sections.[1] Application for membership shall be made to the Secretary of the Society and shall, if possible, be endorsed by two Fellows in the Society. The Governing Council shall have the power of review with regard to applications and shall elect members on the basis of personal knowledge, endorsement of Fellows, and evidence presented on the application blank.

2. Fellows of the Society shall be (1) persons who are actively engaged in research within the field of child development or any of the basic sciences relating thereto, (2) persons who are actively engaged in teaching undergraduate or graduate courses in child development and who have demonstrated their capacity for leadership in the area by publication through appropriate channels, (3) persons who are actively engaged in furthering the stated purposes of the Society.

3. Members of the Society shall be persons who by virtue of work in a related scientific or practical field, or by reason of strong personal interest in the aims and purposes of the Society are eligible for such election. It shall be the responsibility of the Governing Council to decide whether the interest of, and type of work each applicant is engaged in, is in line with the aims and purposes of the Society.

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[1] See Article II, Section 5; Article III, Sections 2 and 4; Article IV, Section 1; Article V, Section 2; Article VII, Section 3.

4. Student Members of the Society shall be persons who at the time of holding membership in the Society are engaged in at least half-time graduate study relative to the purposes of the Society. It shall be the responsibility of the Governing Council to decide whether the work of student applicants is of a sufficiently high caliber to justify their admission to the Society.

5. The Electorate of the Society shall consist of its Fellows and Members.

6. Fees and privileges of Fellows, Members, and Student Members shall be as defined in Article VIII, Sections 1 and 2.

Article III
Meetings

1. Business Meetings of the Society shall be held annually on such dates and at such places as are determined by a majority vote of the Fellows, and Members of the Society present at the previous meeting; or, if this is not possible, the decision shall be made by the Governing Council.

2. Special Business meetings of the Society shall be held at any time upon the call of the Council or upon the call of one-fifth of the Fellows of the Society. The Council shall determine the time and the place of such a special meeting.

3. Notice, in writing, for every regular or special business meeting shall be prepared and mailed to the last known postoffice address of each Fellow, Member, and Student Member of the Society not less than fifteen days before any such meeting, and if for a special meeting, such notice shall state the object or objects thereof.

4. If it should appear advantageous to the members that the Society meet at another place and time so as to coincide with the meetings of other organizations, the Governing Council may arrange for a mail vote of the Fellows and Members regarding change of place and date at least three months before the date of the annual meeting and may arrange for an alternate place and time if the majority of the Fellows and Members responding approve of the proposal.

5. A quorum shall consist of those present, unless the question of number is raised, at which time a quorum of 30 Fellows and Members shall be present.

Article IV
Governing Council

1. There shall be a Governing Council, which shall consist of the President, the Secretary, and Business Manager of the Society, and of six Fellows chosen for terms of three years to be Directors of the Society, all of whom shall be elected by the Society as provided in Article VI.

2. Meetings of the Governing Council may be held at any time on the call of the President. A quorum at any meeting shall consist of a majority

of the entire membership of the Council. The Council shall meet preferably at six month intervals.

3. Members of the Council from distant regions and unable to attend special meetings shall have the privilege of nominating an alternate who shall be empowered to act in his (or her) place, providing the nominee is a Fellow and the said nomination in writing is approved in advance by the President.

4. The Council shall exercise general supervision of the affairs of the Society, shall elect new Fellows, Members, and Student Members of the Society, and shall make recommendations concerning the conduct of the Society which shall be brought before the Society at any duly constituted meeting and decided by a majority vote of the meeting. The Council shall in general formulate policy to be recommended to the Society, shall appoint Chairmen of committees, and shall move to facilitate the activities of committees by review and recommendations.

5. The President of the Society shall be Chairman of the Governing Council, and the Secretary of the Society shall be Secretary of the Council.

Article V
Officers

1. The officers of the Society shall be: a President, a Secretary, and a Business Manager. They shall hold office until their successors are elected and accept office in their stead.

2. The President and Secretary, who must be Fellows of the Society, shall serve for terms of one and three years, respectively, and shall take office immediately upon election. The Business Manager, who must be a Fellow of the Society, shall serve for a term of six years, and shall take office immediately upon election.

3. The President shall be elected annually, the Secretary every three years, and the Business Manager every six years by the Society, an election ballot being cast under the supervision of the Election Committee whose selection shall be as defined in Article VII, Section 2. Election shall be by plurality of Fellows and Members voting in the election. In case of a tie, election shall be by subsequent ballot listing only the names of those so tied.

4. It shall be the duty of the President to preside at all business meetings of the Society, to act as Chairman of the Council, to exercise general supervision over the affairs of the Society and to perform all such other duties as are incident to his office or as may properly be required of him by vote of the Society or the Council at any duly constituted meeting.

5. It shall be the duty of the Secretary to keep the records of the Society and of the Council in due form; to countersign contracts of the Society except checks; to file and hold subject to call and to direct the publication of such records, reports, and proceedings as are authorized by this Consti-

tution and by vote of the Society or the Council at any duly constituted meeting; to bring to the attention of the Council and Society such matters as he deems necessary; to conduct the official correspondence of the Society and the Council; to issue calls and notices of meetings; to assume and perform in case of the death or incapacitaty of the President the duties of the Chairman of the Society until such time as a successor is qualified for office. In case of the death or disability of the Business Manager, the Secretary shall be empowered to act in his stead, signing checks and performing all duties incident to that office until a new Business Manager is qualified for office.

6. It shall be the duty of the Business Manager to have custody of all funds, deeds, stocks, securities and to deposit the same in the name of this Society in such bank or banks as the Society or Council may direct; to have custody of all other property of the Society not otherwise expressly provided for by this Constitution and to hold same subject to the order and direction of the Society; to collect dues and other debts due the Society by all persons whatsoever; and to execute, seal or deliver any contracts, deeds, instruments or other documents which he shall be directed to execute, seal or deliver on behalf of the Society by this Constitution, vote of the Society or the Counicl. He shall have the authority to sign checks and drafts on behalf of the Society for the disbursement of funds for the duly authorized purposes of the Society as provided by this Constitution, vote of the Society or Council. He shall be bonded for an amount fixed by the Council, the bond to be filed with the Chairman of the Society. He shall at all reasonable times exhibit his books and accounts to any Fellows of the Society. He shall keep a full and complete record of all money received and all money paid out, and shall perform such other duties as may be reasonably required of him by the vote of the Society at a duly constituted meeting or by the Council.

7. All officers of the Society, including the Directors, shall serve until the election and acceptance of their successors. In the case of death, disability or resignation of any of these officers, the Governing Council shall elect a successor to serve until the next duly constituted meeting of the Society.

8. The Society shall provide funds for secretarial or bookkeeping work when such help is necessary and is not otherwise provided for; the amount of which shall be determined by the Governing Council.

9. The fiscal year of the Society shall correspond to the calendar year.

Article VI
Elections

1. Three months before the annual meeting the President shall appoint an Election Committee.[2] The Election Committee shall appoint a slate of

[2] See Article VII, Section 2.

nominees, at least two and not more than four for each position to be filled. The election shall take place by ballot under the supervision of the Election Committee.

2. Those members of the Society who cannot attend the annual meeting during election year may write to the Secretary of the Society after announcement of the nominees has been made in the call of the annual meeting. The said members shall have the privilege of voting by mail provided their ballots are received by the Secretary of the Society one week prior to the annual meeting, and provided their ballots are cast in accordance with procedures for validating signature explained in a circular to be distributed by the Secretary of the Society at the time the slate of candidates is sent to said members of the Society.

Article VII
Committees

1. The Committees of the Society shall consist of such committees as may be provided by this Constitution and such special committees as may be established by vote of the Society or the Governing Council. Fellows, Members, and Student Members of the Society alike shall be eligible for Committee service.

2. The Election Committee shall be selected by the President and shall consist of three Fellows no one of whom is holding any office in the Society. It shall be the duty of the Election Committee to conduct and supervise the mail elections of the Society as provided in Article VI of this Constitution.

3. The Auditing Committee shall consist of three Fellows of the Society selected by the Council. It shall be the duty of the Auditing Committee to examine the books, accounts, statements and business records of the Society and report on their condition to the Society at its annual meeting.

4. The President of the Society shall be a member ex officio of all committees except the Election Committee and the Auditing Committee.

Article VIII
Dues

1. The dues for Fellows, Members, and Student Members of the Society shall be determined by the Governing Council, subject to ratification by the Society at a duly constituted business meeting. Dues shall be payable January first of the year to which they apply. Non-payment of dues for two consecutive years shall be considered as equivalent to resignation from the Society.

2. Any Fellow or Member of the Society shall, upon payment of the dues prescribed in accordance with this Article, be entitled to receive without further charge the publications of the Society.

3. Student Members shall be entitled to receive those publications to which the Governing Council decides they are entitled, in keeping with the amount of dues they are assessed by the Governing Council. Student Members who desire to do so, may pay a fee to be set by the Governing Council in order to receive all publications of the Society.

Article IX
Publications

1. Such records, reports, proceedings and journals containing scientific papers shall be published as are authorized by this Constitution or by vote of the Society or Council at any duly constituted meeting.

2. The Secretary together with the Business Manager shall publish a biennial Directory of the Society giving the names, addresses, and fields of interest of the Fellows, Members, and Student Members of the Society.

Article X
Amendments

The Society at any meeting may, by vote of two-thirds of the Fellows and Members of the Society present, adopt such amendments to the Constitution as it deems necessary for the management of the affairs of the Society, prescribing the duties of officers, committees and employees, and for carrying on all kinds of business within the objects and purposes of the Society, provided, however, that notice in writing shall be given each Fellow and Member of the Society of such amendments at least fifteen days in advance of the regular meeting.

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Information for Contributors and Subscribers

Child Development, one of three publications issued by the Society for Research in Child Development, is issued quarterly in March, June, September and December. The subscription price is $6.00 per year, postpaid. A limited supply of back issues is available at $1.25 per number. Until the supply is exhausted, complete sets, Volumes 1 to 19 inclusive, may be obtained for $42.00.

Other publications of the Society include *Child Development Abstracts and Bibliography* and *Monographs of the Society for Research in Child Development.*

Child Development Abstracts and Bibliography, published in cooperation with the Children's Bureau of the Federal Security Agency, Washington, D.C., is now in its twenty-third volume. This publication is issued February through December —six numbers to a volume. The subscription price is $5.00 per year, postpaid.

Monographs of the Society for Research in Child Development, issued irregularly during the year, consists primarily of detailed critical reviews and seriatim studies. The subscription price is $4.00 per yearly volume.

The three publications of the Society are available at the special price of $12.00 per year.

Manuscripts and *all business correspondence* relating to the publications should be addressed to Child Development Publications, Fayerweather Hall, East, Northwestern University, Evanston, Illinois.